毛泽东思想和中国特色社会主义理论体系概论

学习要求

第一章 马克思主义中国化的历史进程和理论成果

1.学习重点

第一章学习重点是：历史经验证明，马克思主义要在中国发挥指导作用，必须实现马克思主义的中国化。马克思主义中国化，就是要把马克思列宁主义一步一步地同中国革命、建设和改革的实践、同中国历史、中国文化结合起来，使马克思列宁主义在中国民族化和具体化。马克思主义中国化的实质是马克思主义基本原理同中国具体实际相结合。

中国共产党在马克思主义中国化的进程中，先后产生了毛泽东思想、邓小平理论和“三个代表”重要思想。这些理论成果都是马克思主义同中国实际和时代特征相结合的产物，都是中国化的马克思主义，都是中国共产党集体智慧的结晶，都是党必须长期坚持的指导思想。它们之间既是一脉相承的，又是与时俱进的，它们是统一的科学思想体系。

第一节“马克思主义中国化的科学内涵及其历史进程”的学习重点

深刻理解马克思主义中国化的科学内涵，了解马克思主义中国化的历史进程，懂得马克思主义中国化的伟大意义，从而使其坚定马克思主义的基本立场，树立马克思主义的世界观。

第二节“继承和弘扬中华民族优良道德传统”学习重点

了解毛泽东思想形成和发展的历史背景、科学体系和主要内容。使学生明白毛泽东思想在中国革命和建设中所发挥的伟大作用，从而使学生理解毛泽东思想的历史地位和指导意义。

第三节“邓小平理论”学习重点

通过教学，了解邓小平理论形成和发展的历史条件和进程，了解邓小平理论的科学体系和主要内容，使学生理解邓小平理论的历史地位和指导意义。

第四节“三个代表重要思想”学习重点

理解了解“三个代表”重要思想形成和发展的历史条件和历史进程，了解“三个代表”重要思想的科学体系和主要内容，理解“三个代表”、重要思想的历史地位和指导意义。

第五节“科学发展观”的学习重点

理解科学发展观是马克思主义中国化的最新理论成果，理解以人为本是科学发展观的核心、全面协调可持续发展是科学发展观的基本要求。

第二章 马克思主义中国化理论成果的精髓

1．学习重点：

（1）实事求是思想路线的基本内容和重要意义。

（2）实事求是是党的思想路线的实质和核心，也是马克思主义中国化理论成果的精髓。

（3）坚持实事求是，必须不断解放思想.必须弘扬与时俱进精神,不断推进理论创新。必须坚定不移地走自己的路.

2．学习难点

关系类难点：解放思想、实事求是、与时俱进、求真务实之间的关系。

实事求是是党的思想路线的实质和核心,也是马克思主义中国化理论成果的精髓。把握了这个精髓，就把握了马克思主义、毛泽东思想、邓小平理论和“三个代表”重要思想的历史联系及其统一的科学思想体系。因此,本章重点是掌握实事求是思想路线的基本内容和实质。

第一节学习要求，主要任务是对实事求是思想路线的形成和发展有一个清晰的认识,了解四代中央领导人对党的思想路线的贡献以及实事求是、解放思想、与时俱进和求真务实是一脉相承的，是对思想路线认识的不断深化过程的成果。因此，应重点讲清两个过程：“实事求是思想路线的形成和确立的过程”和“实事求是思想路线发展的过程”。

第二节学习要求，主要任务是使学生准确把握党的思想路线的基本内容和核心，实事求是的思想路线是由一切从实际出发、理论联系实际、实事求是和实践是检验真理唯一标准四个方面构成的一个相互联系的统一整体，它是马克思主义中国化理论成果的精髓，也是中国共产党最根本的思想方法和工作方法。因此，应重点讲清四方面内容的基本含义和方法论意义。

第三节 作为本章的落脚点，主要任务是使学生认识到党的思想路线的核心和马克思主义中国化理论成果的精髓的一致性,明确坚持实事求是,就要继续解放思想,不断推进理论创新和实践创新。因此，应重点讲清“一个精髓”和“三个必须”。

第三章 新民主主义革命理论

学习重点

第三章教学重点包括近代中国社会的国情和主要矛盾，新民主主义革命的总路线，新民主主义革命的政治、经济、文化纲领，中国革命走农村包围城市、武装夺取政权道路的依据及意义，统一战线、武装斗争、党的建设对中国革命的重要性。

第一节“新民主主义革命理论的形成”教学重点是让学生在认清中国国情和中国革命时代特征的基础上，帮助学生理解新民主主义革命理论不是凭空产生，它是时代的需要，是中国社会发展的需要。在分析中国革命的艰辛历程中，帮助学生认识到新民主主义革命理论是对中国革命实践的总结和概括。

第二节“新民主主义革命的总路线和基本纲领”教学重点是让学生记忆并理解新民主主义革命的总路线和基本纲领。对新民主主义革命的动力中所包含的民族资产阶级的分析，新民主主义革命的领导权和新民主主义革命的性质应是分析的重点。新民主主义革命的基本纲领是总路线的具体化，对经济纲领中对待地主土地、官僚资本，民族工商业的不同政策应该成为分析的重点。

第三节“新民主主义革命的道路和基本经验”教学重点是帮助学生认识以毛泽东为代表的中国共产党人探索新道路的艰辛和中国走农村包围城市、武装夺取政权道路的依据，帮助学生理解三大法宝对中国革命的重要性。

第四章 社会主义改造理论

学习重点

第四章学习重点是如何正确理解建国后我国社会主义改造的历史必然性和中国特色的社会主义改造道路。教师在教学过程中，要帮助高职大学生了解我国新民主主义社会的过渡性质，掌握新民主主义社会向社会主义社会过渡的历史必然性，掌握中国特色的社会主义改造道路，尤其是对农业和资本主义工商业的改造，深刻理解中国确立社会主义制度的伟大意义。

第一节“从新民主主义到社会主义的转变”教学重点

帮助高职大学生了解新民主主义社会的性质、特点和主要矛盾，掌握社会主义改造的历史必然性和过渡时期总路线的具体内容。

第二节“社会主义改造道路和历史经验”教学重点

帮助高职大学生了解中国特色的社会主义改造的具体内容，尤其重点掌握对农业和资本主义工商业的社会主义改造，掌握中国特色社会主义改造的历史经验。

第三节“社会主义制度在中国的确立”教学重点

帮助高职大学生使学生了解社会主义制度在中国的确立以及确立的历史意义，从情感上高度认同社会主义方向，坚定社会主义信念，拥护社会主义制度。

第五章 社会主义的本质和根本任务

学习重点

第五章学习重点是如何正确理解社会主义本质的科学内涵及社会主义的根本任务。教师在教学过程中，要帮助高职大学生认识中国共产党人对在中国如何建设社会主义的问题进行了哪些艰辛的探索？有哪些经教训？搞清楚发展是党执政兴国的第一要务。

第一节“中国特色社会主义建设道路的初步探索”学习重点

帮助高职大学生认识到毛泽东对适合中国国情的社会主义建设道路的探索，是同总结第一个五年计划执行过程中的经验教训相联系的，也是同如何借鉴苏联社会主义建设的经验相联系的。毛泽东的相关著作和论述有：《论十大关系》，《关于正确处理人民内部矛盾的问题》等 。党的十一届三中全会以前，虽然我们党在社会主义建设的探索过程中犯过包括“文化大革命”这样严重的错误，遭受了重大挫折，但从总体上看，我国在经济建设上所取得的成就仍然是巨大的。八大以后社会主义建设二十多年的曲折发展也深刻地教育了全党，为我们逐步掌握建设社会主义的规律提供了宝贵的经验教训。党对中国社会主义建设道路的初步探索及其所取得的成果，成为十一届三中全会以后邓小平提出“搞清楚什么是社会主义”的前提和条件，为中国共产党实现马克思主义基本原理和中国具体实际相结合的第二次历史性飞跃提供了基础。

第二节“对社会主义本质的新认识”学习重点

第一,了解邓小平对社会主义本质所作的新的理论概括的时代背景。邓小平对社会主义本质所作的新的理论概括,是从我们长期以来没有完全搞清楚什么是社会主义、怎样建设和发展社会主义这个问题，因而影响了社会主义优越性的发挥这一实际出发，经过深入思考，发现了问题的症结所在以后提出来的。这一新的理论概括，从历来关于社会主义经济、政治、社会等多个方面的特征中，抽象出“社会主义的本质”这一范畴，从更深的层次上使人们科学地理解究竟什么是社会主义，从而也为探索建设和发展社会主义的新道路和新方法，提供了坚实的理论基础。

第二,如何正确理解邓小平提出关于社会主义本质的科学论断：“社会主义的本质，是解放生产力，发展生产力，消灭剥削，消除两极分化，最终达到共同富裕。”

第三，理解社会主义本质的理论和实践意义。第一，社会主义本质理论把我们对社会主义的认识提高到了一个新的科学水平;第二，社会主义本质理论对探索怎样建设社会主义具有重要的实践意义。

第三节“社会主义的根本任务”学习重点

帮助高职大学生理解把发展作为执政兴国的第一要务是由中国共产党的执政地位所决定的，是对执政规律认识的深化，也是党实现对所承担的历史责任的需要。我国这样一个发展中大国，能不能解决好发展问题，直接关系人心向背、事业兴衰。中国共产党的执政地位是人民的选择，而人民之所以选择中国共产党，从根本上说是因为它能够领导中国实现民富国强、振兴中华。只有紧紧抓住发展这个执政兴国的第一要务，党才能实现自己在新世纪新阶段的历史使命，承担起自己的历史责任。因为不论是实现全面建设小康社会的宏伟目标，进一步提高人民的物质文化生活水平，增强我国的综合国力，实现中华民族的伟大复兴，还是实现祖国的完全统一和促进世界和平与发展的崇高事业，都要靠发展。只有把发展作为主题，才能从根本上把握人民的愿望，不断巩固和发展党执政的群众基础，把中国特色社会主义事业不断推向前进，并通过几代人、十几代人甚至几十代人的努力，创造出比资本主义更发达的生产力，使人民群众享受更多的实际利益，使社会主义更好地显示出自己的优越性。也只有靠发展，才能说服那些不相信社会主义的人，坚定对社会主义和祖国未来前途的信念和信心。

第六章 社会主义初级阶段理论

学习重点

社会主义初级阶段理论是是邓小平理论的基石、立论基础，也是现阶段去我们党制定路线、政策的出发点和根本依据。本章的教学重点如何正确理解社会主义初级阶段是我国最大的实际以及中国特色社会主义建设的奋斗目标，准确把握党在社会主义初级阶段的基本路线、基本纲领和发展战略。

第一节“社会主义初级阶段是我国最大的实际”学习重点

教师在教学过程中，要使学生明确：我国处在社会主义初级阶段，是中国共产党和邓小平对当代中国基本国情的科学判断，提出“社会主义初级阶段”这一具有特定内涵的新概念，在马克思主义发展史上是第一次。掌握社会主义初级阶段的科学含义和主要特征。正确理解我国社会主义初级阶段的长期性。

第二节“社会主义初级阶段的基本路线和基本纲领”学习重点

教师在教学过程中，要使学生明确：人民日益增长的物质文化需要同落后的社会生产之间的矛盾是社会主义初级阶段的主要矛盾，党的基本路线是党在社会主义初级阶段为解决社会主要矛盾而制定的行动纲领，是总揽全局的根本指导方针。掌握党在社会主义初级阶段的基本路线和基本纲领。正确理解“一个中心”和“两个基本点”之间的相互关系。牢固树立坚持党的基本路线百年不动摇的坚定信心。

第三节“社会主义初级阶段的发展战略” 学习重点

教师在教学过程中，要使学生明确：“三步走”的发展战略是社会主义初级阶段的发展战略，全面建设小康社会是党和国家到 2020 年的奋斗目标，是全国各族人民的根本利益所在。正确理解十七大对我国全面建设小康社会目标提出新的更高要求。

第七章 社会主义改革和对外开放

学习重点

第七章教学重点是如何正确理解改革开放是一场新的伟大革命，准确把握社会主义的基本矛盾。毫不动摇地坚持对外开放，做一位改革开放的忠实践行者。
教师在教学过程中，要帮助高职大学生了解改革开放的时代背景和重大意义 ， 帮助高职大学生理解改革是全面改革，认识如何正确处理改革 发展 稳定三者的关系。明确当代青年维护国家稳定的时代要求.牢记毫不动摇地坚持对外开放必须付诸行动，没有行动就不可能培养树立中国的发展离不开世界的全球意识，提高驾驭开放型经济水平。

第一节“社会主义改革和对外开放”学习重点

帮助高职大学生深刻理解改革开放是一场新的伟大革命。改革是一场新的革命，是社会主义制度的自我完善和发展。它不是原有经济体制的细枝末节的修补，而是对原有经济体制的根本性变革。它的实质和目标，是要从根本上改变束缚我国生产力发展的经济体制，建立充满生机和活力的社会主义新经济体制，同时相应地改革政治体制和其他方面的体制，以实现中国的社会主义现代化。

社会主义社会的基本矛盾仍然是生产关系和生产力之间的矛盾、上层建筑和经济基础之间的矛盾，它们不但表现在社会生活的各个方面，而且贯穿于社会主义社会的始终，是推动社会主义社会不断前进的根本动力。

第二节“坚定不移地推进全面改革”学习重点

帮助高职大学生了解中国的改革是全面的改革，这是由改革的任务决定的。在全面改革中，经济体制改革是重点。因为通过经济体制改革，解放生产力，把国民经济搞上去，对当代中国来说是最根本最急迫的任务。经济体制改革需要政治体制及其他体制改革的配合，因此，在经济体制改革不断深化的进程中，政治体制改革也在不断推进。

正确处理改革、发展、稳定的关系。中国的问题，压倒一切的是稳定，没有稳定的环境，什么都搞不成，已经取得的成果也会失掉。稳定是前提，把改革的力度、发展的速度和社会可以承受的程度统一起来。人民群众是改革发展的主体和动力，是稳定的力量源泉和深厚基础。改善人民生活，让人民共享改革和发展的成果，是我们致力于发展、积极推进改革、坚持维护稳定的共同目的。

第三节“毫不动摇地坚持对外开放”学习重点

帮助高职大学生了解当今的世界是开放的世界，这是对世界经济发展历史的深刻总结，是生产社会化和商品经济、市场经济发展的必然结果。中国的发展离不开世界。这是对中国发展历史的深刻总结。

对外开放是全方位、多层次、宽领域的开放

党的十一届三中全会以后，我国开始了对外开放的历史进程，随着经济特区的建立，沿海城市的开放，引进外资、对外经济技术交流与合作的迅速扩大，我国经济摆脱了原来的封闭半封闭状态，逐步形成了全方位、多层次、宽领域的对外开放格局。

不断提高对外开放水平

随着我国参与经济全球化程度的加深，对外开放面临着一系列新的问题和挑战。我国的对外开放逐步进入了由较小范围和有限领域的开放，转变为更大范围和更多领域的开放；由以试点为特征的政策主导下的开放，转变为法律框架下可预见的开放；由单方面为主的自我开放，转变为与世贸组织成员之间的相互开放。这意味着竞争更激烈，经济风险更大，政府的宏观调控的难度增加。必须适应经济全球化趋势的新发展，以更加积极的姿态走向世界，更好地实施“引进来”和“走出去”同时并举、相互促进的开放战略，努力在“走出去”方面取得明显进展，更好地利用国际国内两个市场、两种资源，在激烈的国际竞争中掌握主动权，不断提高对外开放水平。

第八章 建设中国特色社会主义经济

学习重点

第八章是中国特色社会主义经济的基本理论，本章的教学重点是正确理解社会主义市场经济的科学内涵，准确把握党对我国社会主义初级阶段基本经济制度和分配制度的新概括，全面理解公有制和按劳分配的含义及其主体地位，正确认识和处理公有制经济和非公有制经济、按劳分配和按生产要素分配的关系，理解国民经济又好又快发展的内涵和战略举措。教师在教学过程中，要帮助高职大学生了解目前我国的经济体制是社会主义市场经济，公有制为主体、多种所有制经济共同发展是社会主义初级阶段的基本经济制度，按劳分配为主体、多种分配方式并存是社会主义初级阶段的分配制度，掌握促进国民经济又好又快发展的战略措施。

第一节“建立社会主义市场经济体制”学习重点

教师在教学过程中，要帮助高职大学生明确，社会主义市场经济体制是我国经济体制改革选择的目标模式；邓小平是社会主义市场经济理论的奠基人；社会主义市场经济是社会主义基本制度与市场经济的结合，作为社会主义的制度特征，主要表现在所有制结构、分配制度和宏观调控三个方面。

第二节“社会主义初级阶段的基本经济制度”学习重点

教师在教学过程中，要帮助高职大学生明确，公有制为主体、多种所有制经济共同发展是社会主义初级阶段的基本经济制度以及这一基本经济制度的基本根据；全面理解公有制经济的含义、主体地位，国有经济的主导作用，以及公有制经济的实现形式；正确理解非公有制经济的含义和作用。

第三节“社会主义初级阶段的分配制度”学习重点

教师在教学过程中，要帮助高职大学生明确，按劳分配为主体、多种分配方式并存是社会主义初级阶段的分配制度，深化分配制度改革，必须正确处理好“先富”与“共富”、公平与效率、反对平均主义与防止收入悬殊的关系。

第四节“促进国民经济又好又快发展”学习重点

教师在教学过程中，要帮助高职大学生明确，保持我国国民经济又好又快发展，全面建设小康社会，必须在科学发展观指引下，提高自主创新能力、建设创新型国家，转变经济发展方式，建设社会主义新农村，统筹区域发展，建设资源节约型、环境友好型社会。

第九章 建设中国特色社会主义政治

学习重点

第九章学习重点是帮助同学了解中国特色的社会主义政治制度，理解依法治国的内涵和重要性，理解加强社会主义法制建设的基本要求，掌握社会主义社会的民主、自由和人权与资本主义社会民主、自由和人权的区别和联系，能够正确评价社会主义的民主、自有和人权。

第一节“中国特色社会主义的民主政治”学习重点

本节的教学重点是帮助学生从总体上把握中国特色社会主义民主政治的根本：即坚持党的领导、人民当家作主和依法治国的有机统一，理解中国特色社会主义的民主制度。学生或许对中国特色的民主制度，比如人民代表大会制度、民族区域自治制度了解一点，但不能深入了解制度的本质，更不会联系中国现实社会的重大政治事件去进行分析。学习本章要帮助学生不仅从理论上了解这些制度的实质，还要联系中国社会热点，比如每年三月的全国“两会”和中国共产党的重要会议，来讲解人民代表大

会制度和中国共产党领导的多党合作和政治协商制度。在讲解时，还可以联系深圳每年“两会”的热点来帮助学生了解深圳市情，学习中国民主制度理论。

第二节“依法治国，建设社会主义法治国家”学习重点

本节的教学重点是帮助学生掌握依法治国的内涵和重要性，领悟加强社会主义法制建设的基本要求，提高对我国民主制度的认识。

第三节“推进政治体制改革，发展民主政治”学习重点

本节的教学重点是帮助学生理解我国政治体制改革的原则和对社会主义民主、自由和人权的认识和评价，能独立分析社会主义民主、自由和人权与资本主义民主、自由和人权的本质区别和联系。

第十章 建设中国特色社会主义文化

1．学习重点：

（1）中国特色社会主义文化建设的战略地位、根本任务、指导方针；

（2）建设社会主义核心价值体系的重大意义和基本内容。

2．教学难点

（1）关系类难点：如何认识文化、先进文化、社会主义先进文化、和谐文化和中国特色社会主义文化的关系；

（2）概念类难点：如何把握价值观、核心价值观、核心价值体系、社会主义核心价值体系的基本内涵；

（3）观念类难点：如何理解只有坚持马克思主义指导地位，才能保证中国特色社会主义文化持久的繁荣发展；如何理解社会主义核心价值体系基本内容“四个方面”的辩证统一关系。

此外，本章与《思想道德修养与法律基础》课第一章第一节、第二章整章、第二章第一节普遍重复，如何在避免重复的基础上，让教学富有新颖性、深刻性、针对性和实效性，便成为教材处理和教学内容处理过程中一个必须妥恰解决的难题。

第十一章 构建社会主义和谐社会

学习重点

第十一章是构建社会主义和谐社会的基本理论，本章的教学重点是正确理解构建社会主义和谐社会的科学含义及其意义，准确把握构建社会主义和谐社会的指导思想、基本原则和目标任务，深入领会“改善民生”是当前构建社会主义和谐社会的主要任务。教师在教学过程中，要帮助高职大学生了解构建社会主义和谐社会的重要性和紧迫性，掌握构建社会主义和谐社会的总体思路。

第一节“建社会主义和谐社会的重要性和紧迫性”学习重点

教师在教学过程中，要帮助高职大学生明确，社会和谐是中国特色社会主义的本质属性，是国家富强、民族振兴、人民幸福的重要保证。构建社会主义和谐社会，反映了建设富强民主文明和谐的社会主义现代化国家的内在要求，体现了全党全国各族人民的共同愿望；我们要构建的社会主义和谐社会，是在中国特色社会主义道路上，中国共产党领导全体人民共同建设、共同享有的和谐社会；是民主法治、公平正义、诚信友爱、充满活力、安定有序、人与自然和谐相处的社会；提出构建社会主义和谐社会，是对人类社会发展规律、社会主义建设规律和共产党执政规律认识的深化，是对马克思主义关于社会主义社会建设理论的丰富和发展。

第二节“构建社会主义和谐社会的总体思路”学习重点

教师在教学过程中，要帮助高职大学生明确，构建社会主义和谐社会，要遵循以下原则：必须坚持以人为本，必须坚持科学发展，必须坚持改革开放，必须坚持民主法治，必须坚持正确处理改革发展稳定的关系，必须坚持在党的领导下全社会共同建设；构建社会主义和谐社会，必须坚持协调发展，加强社会事业建设；必须加强制度建设，保障社会公平正义；必须建设和谐文化，巩固社会和谐的思想道德基础；必须完善社会管理，保持社会安定有序；必须激发社会活力，增进社会团结和睦；必须加强党对构建社会主义和谐社会的领导。

第十二章 祖国完全统一的构想

学习重点

第十二章学习重点是如何正确理解“和平统一，一国两制”构想的内涵及其在香港和澳门的成功实践，坚信“和平统一，一国两制”构想是当前解决台湾问题的最佳途径，准确把握当前党中央对台政策。教师在教学过程中，要帮助学生正确理解“和平统一，一国两制”构想产生的过程、内涵和意义；通过香港和澳门的顺利回归，证明“和平统一，一国两制”构想是当前解决台湾问题的最佳途径；引导学生正确理解江泽民、胡锦涛在新的历史条件下对“和平统一，一国两制”构想的发展，准确把握当前党中央的对台方针、政策和措施。

第一节“实现祖国完全统一是中华民族的根本利益”学习重点：维护祖国统一是中华民族的爱国主义传统；实现祖国完全统一是中华民族伟大复兴的历史任务之实现祖国完全统一是中国人民不可动摇的坚强意志。

第二节“从武力解放台湾到和平解放台湾”学习要点：台湾问题的由来和实质；武力解放台湾的方针；和平解放台湾的方针。

第三节“‘和平统一、一国两制’的科学构想”教学重点：“和平统一、一国两制”基本方针的形成和确立；“和平统一、一国两制”构想的基本内容和重要意义；“一国两制”构想在香港、澳门的成功实践。

第四节“新形势下‘和平统一、一国两制’科学构想的重要发展”学习重点：

主要有两个方面：对“和平统一、一国两制”构想的丰富和发展；新世纪新阶段的对台方针政策

第十三章 国际战略和外交政策

学习重点：

第十三章教学的重点是如何正确理解和平与发展是当今时代主题和独立自主和平外交政策的内涵，准确把握时代特征和当代中国外交的基本原则。教师在教学过程中，要通过重点分析和讲解，帮助学生正确理解和平与发展是当今时代主题这一英明论断的内涵、依据和意义，把握新时期中国独立自主和平外交政策的基本原则和主张。

第一节“国际形势的发展及特点”教学重点

帮助学生理解时代主题，是指在一定历史时期内反映世界基本特征并对世界形势的发展具有全局性影响和战略性意义的问题，就是一定历史条件下世界历史发展进程中需要解决的主要问题，懂得科学认识和准确把握时代主题是制定正确发展战略和内外政策的一个重要前提，深刻领会和平与发展是当今时代主题这一英明论断的内涵、依据和意义。

第二节“独立自主的和平外交政策”学习重点

帮助学生深刻理解中国独立自主和平外交政策的基本原则和新时期中国外交政策的基本主张。

第十四章 中国特色社会主义事业的依靠力量

学习重点

第十四章教学重点是告诉学生：建设中国特色社会主义是一项前无古人的伟大而艰巨的事业，完成这一事业，依靠谁，团结谁，是一个至关重要的问题。在新的历史条件下，要认识到工人、农民和知识分子是国家的主人，是决定国家前途和命运的根本力量，新的社会阶层是中国特色社会主义事业的建设者，统一战线仍然是一个重要法宝，中国人民解放军是中国特色社会主义事业的钢铁长城和重要的建设力量，正确处理好这些关系关系到中国特色社会主义事业能否获得最广泛最可靠的群众基础和力量源泉。

第一节“建设中国特色社会主义是全国各族人民的共同事业”的学习重点

帮助高职大学生深刻理解工人、农民和知识分子是建设中国特色社会主义事业的根本力量；新的社会阶层是中国特色社会主义事业的建设者；要保证社会主义现代化事业顺利进行，必须尊重劳动、尊重知识、尊重人才、尊重创造，同时要巩固和加强各族人民的团结合作。

第二节“巩固和发展爱国统一战线”学习重点

帮助高职大学生认识到统一战线是中国革命、建设和改革的重要法宝，了解新时期爱国统一战线的内容和基本任务，懂得党的民族政策和宗教政策，从而加强学生行动中的自觉性。

第三节“加强国防和军队现代化建设”学习重点

通过教学，帮助高职大学生认识到中国人民解放军是保卫祖国的钢铁长城和社会主义现代化建设的重要力量，懂得建立巩固的国防是国家现代化建设的战略任务，知道什么是新时期新世纪人民军队的历史使命，了解积极推进中国特色军事变革的必要性和内容。

第十五章 中国特色社会主义事业的领导核心

学习重点

第十五章学习重点是：在中国这样一个多民族的发展中大国进行社会主义现代化建设必须依靠中国共产党的领导；在新的历史条件下坚持党的领导必须改善党的领导；中国共产党在长期执政和改革开放的历史条件下必须解决的关键问题是如何以改革创新精神全面推进党的建设的伟大工程。

第一节“党的建设是社会主义现代化建设的根本保证”的学习重点

帮助高职大学生深刻理解中国共产党的性质和宗旨，明白中国共产党的执政地位是历史和人民的选择。

第二节“坚持立党为公、执政为民”学习重点

帮助高职大学生懂得中国共产党的最大政治优势是密切联系群众，党执政后的最大危险是脱离群众，最根本的问题是能否做到全心全意为人民服务。

第三节“以改革创新精神全面推进党的建设”学习重点

通过教学，帮助大学生明白在新的历史条件下，中国共产党要带领全国各民族人民全面建设小康社会，实现推进现代化建设，完成中国统一、维护世界和平与促进共同发展这三大历史任务，必须大力加强执政能力和先进性建设。

作业题

一、学习思考题

第一章 1、5
第二章 5
第三章 1
第四章 5
第五章 4
第六章 6
第七章 2
第八章 6
第九章 6
第十章 4
第十一章 3
第十二章 4
第十三章 5
第十四章 1
第十五章 6
第十六章 6

二、学习最终要求：结合工作实践完成一篇不少于 3000 字的学习心得体会

大学英语课程说明

授课时间 2016-2017 下学期　　编写时间 2017-04

课程名称	给排水专业英语	课程代码	3161059	总学时 32 讲课：32 学时
		学 分	2	
课程性质	公共课（ ） 专业基础课（ ） 专业课（ ） 专业选修课（√ ）	所属学院	建筑工程学院	
任课教师	张瑞	职 称	讲师	
教材和主要参考资料	《给水排水工程与环境工程专业英语》杨维 机械工业出版社			
教学目的与要求	给排水专业英语作为给排水科学与工程专业选修课，通过该课程的学习，使学生熟悉科技英语常用句型、结构及语法基础，扩充专业词汇，掌握迅速查阅外文文献的途径及方法，提高阅读速度。使学生成为既具备给排水科学与工程专业知识，同时兼备科技英语应用能力的高技能人才。			
教学重点与难点	**教学重点：**通过学习使学员做到：牢固、系统掌握英语语法，在原水平基础上，显著的扩大专业英语词汇（新增 2000-3000 个词汇量），熟悉科技英语结构及文体，能顺利阅读英语专业文献资料。 **教学难点：**英语写作有关材料，公务信函（Business Letter）、摘要（Abstract）、研究论文（Research Paper）等。			

教 学 课 时 分 配

序 号	授课章节及名称	分配学时	备 注
1	绪论 世界名校给排水专业介绍	2	
2	Unit 1 Introduction of Water supply	2	
3	unit 2 Water Sources	2	
4	Unit 3 The Property of Water	2	
5	Unit 4 Laws Pertaining to Water and Environment	2	
6	数据库使用，查找专业文献，制作英文海报	2	
7	Unit 5 Water-supply System	2	
8	Unit 6 Pumps	2	
9	Unit 7 Plumbing	2	
10	Unit 8 Wastewater Collection and Sewer Design	2	
11	Unit 9 Water Treatment Processes	2	
12	Unit 10 Sedimentation	2	
13	Unit 11 Filtration	2	
14	Unit 12 Disinfection of Drinking Water	2	
15	Uint 13 Wastewater Treatment Methods	2	
16	英文论文写作	2	

课程说明

第 1 次课　　学时 2

章 节	绪论 世界名校给排水专业介绍
教学目的 和 教学要求	1. 介绍国外名校给排水相关专业概况。 2.使学生对国外名校的给排水科学与工程相关专业有一定了解，开阔学生视野。 3.介绍国外大学申请条件、流程，使学生在今后的学习中更具有方向性，并激发学习热情。 4.学会利用网络资源快速获取申请学校的有效信息。
教 学 重 点 难 点	1.国外学校及专业介绍的英语词汇和术语。 2.不同学校的网站设置不同，涉及的词汇、流程也不同，对学生英语基础要求较高。
教学进程 （含章节 教学内容、 学时分配、 教学方法、 辅助手段）	**1.Programme overview** **（1）Special features of the programme** • An opportunity to specialise in fields where we have world-leading expertise, such as water and wastewatertreatment, coastal hydraulics and modelling of hydrological processes. • Accessible and engaged teachers who will give you thorough feedback and help you progress throughout your studies. • Strong industry links and opportunities to work closely with local and international organisations. • A multinational, innovative and interactive learning environment. **（2）Career prospects** The need for clean water and sanitation is a global concern affecting large, densely populated cities and smaller communities in industrialised and developing regions alike. This Master's programme will prepare you for a rewarding and challenging career within an essential profession. Most of our graduates play important roles in the water sector all over the world, and their educational experience in Lund has assisted them in becoming outstanding professionals. The skills they have acquired during the programme are sought after by organisations in a wide variety of industries, from large multinational corporations and non-profit organisations, to regional and national government bodies. Many go on to become Hydrologists, Process Engineers, Hydrogeologists, Consultants and Water Resource Managers. Others pursue an academic career within prestigious universities. **2.Admission requirements** BSc in Civil Engineering, Environmental Engineering or equivalent BSc including courses in geology, mathematics/calculus and hydraulics/fluid mechanics. English 6/English Course B. **（1）English language requirements**

	The general English language proficiency requirement for programmes offered at Lund University is English 6 (English B). However, some programmes may have a higher requirement, if so, this will be stated on this page. For more information about English language requirements and documents to submit, please read here. **（2）Minimum English language requirements** Most Lund University programmes and courses require what is called "English 6/English course B" (advanced level) language proficiency, which can be demonstrated in one of the following ways: • IELTS (Academic) total score 6.5 (with no section less than 5.5) • TOEFL paper-based score of 4.5 (scale 1-6) in written test and a total score of 575 • TOEFL internet-based score of 20 (scale 0-30) in written test and a total score of 90 See the other accepted international tests on the University Admissions in Sweden webpages **（3）Exemptions** Students who have previously studied in English may be exempt from submitting formal test results to show their English abilities. Check theUniversity Admissions in Sweden webpages for detailed information on these exemptions. Please note that the exemptions must be met exactly as stated on the University Admissions in Sweden website. It is not acceptable to simply include a certificate from your university stating your studies were taught in English. **（4）Higher English language requirements for some programmes** Some programmes require a higher English language proficiency level, for example "English 7/English course C". In addition, a small number of programmes (in the subject area of English language) demand that all students demonstrate a specific level of language proficiency through a test, regardless of previous studies or mother tongue language. Always check the programme's admission requirements for details. **3.Tuition fees & payment** • Full programme/course tuition fee:280000 SEK • First payment:70000 SEK **An EU/EEA-student** is a student from the European Union/European Economic Area or Switzerland. **A non EU/EEA**-student is a student from a country outside of the European Union/European Economic Area or Switzerland. • Tuition fees are to be paid in SEK. The Euro price is for comparison only. • Tuition fees do not apply for exchange students, PhD students or EU/EEA students.

	• Students who are citizens of countries outside of the European Union (EU), European Economic Area (EEA) and Switzerland are generally required to pay application and tuition fees. There are some **exceptions** to this general rule. The following is a list of criteria which exempts individuals, meaning they do not have to pay application and tuition fees. If you do not meet any of these criteria, you are most likely required to pay fees. You are **NOT** required to pay application and tuition fees if: • You have Swedish citizenship • You have been granted a permanent Swedish residency permit • You have been granted a temporary Swedish residency permit for reasons other than studies (having a temporary residency permit for studies in Sweden does NOT grant you exemption from fee payments) • You have citizenship of a European Union (EU) country, European Economic Area (EEA) country, or Switzerland • You are a family member of a citizen of an EU or EEA country, or Switzerland, and have temporary or permanent right of residence in Sweden • You have long-term resident status in Sweden • You have long-term resident status in another country in the European Union and have Swedish residency • You are applying for or are registered for third-cycle (doctoral) studies. Application and tuition fees are only required for studies in the first cycle (Bachelor's) and second cycle (Master's) • You are registered at a university or university college outside of Sweden and will be studying in Sweden on a temporary basis as part of an official study abroad programme as an exchange student. For more information regarding residence permits, please see the Swedish Migration Board website. Tuition fees are usually stated per programme per year. For courses, tuition fees are usually stated for the full course. In one year of full-time studies you will normally acquire 60 ECTS. However, tuition fees are linked to the amount of credits, ECTS and not the time you study. The fee is always the same per ECTS regardless of your study pace. **4.Scholarships** **（1）Lund University Global Scholarship programme** The Lund University Global Scholarship programme is targeted at top academic students from countries outside the EU/EEA (and Switzerland). You apply for a Lund University Global Scholarship after you have applied for the programme/or free-standing

	course you wish to study at Lund University. **（2）Lund University Regional Excellence Awards** The Regional Excellence Awards are a part of the Lund University Global Scholarship Programme. These scholarships are open for top students applying to Bachelor's or Master's studies and who are nationals of, or have their first degree from USA, Canada, China, India, Indonesia, Thailand, Singapore, East Timor, Philippines, Brunei, Cambodia, Laos, Burma, Malaysia or Vietnam. **（3）Swedish Institute Scholarships** The Swedish Institute offers several scholarship programmes for international students studying at Bachelor's, Master's, PhD and post-doctoral levels. Swedish Institute Study Scholarship: The Swedish Institute Study Scholarships target highly qualified students from certain countries who have been admitted to study programmes in Sweden. For full information about nominated programmes and other details please review the Swedish Institute Study Scholarship webpage. Other Swedish Institute Scholarships: Visby Programme - Swedish Institute Baltic Sea Region Swedish Institute Scholarships for East Europe Swedish-Turkish Programme For full information and details please review the Swedish Institute Scholarship information webpage. **（4）Country-specific scholarships** Brazil: Brazilian students can apply to the Science without Bordersscholarship programme Indonesia: Lund University has an agreement with LPDP which allows Indonesian students to apply for full scholarships from LPDP, read more on http://www.lpdp.depkeu.go.id/ Mexico: Students from Mexico admitted to Master's degree programmes at Lund University and who also receive funding from the Mexican Government’s Fund for Human Resource Development (FIDERH) may be eligible for a partial scholarship. For more information, please contact the Student Finance Administrator at Lund Universitystudielan@er.lu.se. Read more about FIDERH on http://www.fiderh.org.mx/english.html **（5）US Student Finance** Lund University is a participating institution in the US Government Federal William D. Ford Direct Loan Program for undergraduate, Master’s and doctoral programmes. This

includes the Stafford Loans and the Graduate Plus Loans. Please note that this loan programme is only available to US citizens or eligible non-citizens. Read more about US student finance and Lund University.

5.How to apply

Please read this entire page carefully before you apply!

In general, all students wishing to study Bachelor's or Master's level programmes and courses at a Swedish university must apply online, using the national University Admissions in Sweden website calleduniversityadmissions.se. Note that there is a different process if you plan to come as an exchange student or as an Erasmus Mundus or Erasmus Mundus Action 2 student – read more here. If you are a Brazilian student applying through the scholarship programme "Science without Borders" you should follow the application instructions here on the Study in Sweden website.

Key steps to apply:

1. Here on the programme webpages you will find a link with the message "apply now". Follow that link to go directly to University Admissions in Sweden (this link is only available when the application round is open)

2. Create an account on the national University Admissions in Sweden website and follow the steps to make your online application

3. Submit all supporting documents to University Admissions in Sweden so that they are received before the deadline. Documents can either be sent to the address: University Admissions in Sweden, FE 20102, SE–839 87 Östersund, SWEDEN OR, depending on the country you are from, you may be able to upload a scanned copy of your original documents on universityadmissions.se. Check the country-specific document rules for Master's studies and for Bachelor's studies before you submit the following documents:

Cover sheet (printed from your online application)

All official certificates, diplomas and transcripts that are required to prove you meet the admission requirements*. If you send copies of these documents by regular post they need to be certified. If you upload your documents you do not have to certify them; however, you need to make sure you scan the original documents

Proof of English language skills (e.g. TOEFL or IELTS test)

A copy of the page in your passport with your personal data and photograph (please scan the original if uploading your ID-documents to universityadmissions.se)

Any additional documents required by the programme or course as part of their selection requirements (e.g. statement of purpose, CV, reference letters). If such documents are required, this will be stated below. If nothing is stated below, you only need to submit the documents in the checklist above.

	4. Pay the University Admissions in Sweden application fee before the deadline to ensure your application will be considered (for non-EU/EEA students). Read further details on our applying for studies webpages. *If you are applying to a Master's programme and have studied you entire Bachelor's programme in Sweden and all your academic credits are registered in Ladok, you do not have to submit any transcripts or your diploma when applying.
作　业	1.在网站上搜索 1 所外国学校，给排水科学与工程相关专业的硕士项目（提交 word 版专业介绍网站、申请条件、申请日期、学费、奖助情况）。 2.选其中自己喜欢的学校做 PPT 展示。
主要 参考资料	世界名校网站（网络资源）
备注	以 Lund 大学 Water Resource Engineering 专业为例进行介绍，由于每年申请都会发生变化，须根据当年申请要求定期更新教学内容。

课程说明

第 2 次课　　学时 2

课目、课题	Unit 1 Introduction of Water Supply
教学目的 和 教学要求	讲解 Water Supply 相关专业技术词汇和术语 引导完成 Unit 1 短文的阅读 进一步剖析 Introduction of Water Supply 语法特点和表述方法 教授科技英语翻译方法与技巧——词义的选择
重　点 难　点	Water Supply 相关专业技术词汇和术语
教学进程 （含课堂教学内容、教学方法、辅助手段、师生互动、时间分配、板书设计）	**New Words and Expressions** drain v.排水 n.排水（管）；latrine n.公共厕所；Neolithic a.新石器时代的；clay n.粘(泥，白)土；sewage n.污水（常指生活污水）；flush v.冲洗；drainage n.排水（工程）；排水区域，流域；fountain n.（人造）喷泉，泉水；aqueduct n.沟渠，渡槽，导水管；sewer n.污水管，下水道，阴沟；conveyance n.输[送]水，运输；sanitation n.公共卫生，卫生设(尤指排水设备)；sanitary a.（环境）卫生的；obligatory a.强制性的，义务的；专性的 cesspit n.污水坑，粪坑；aquifer n.含水层；contaminate v.污染；objectionable a.令人讨厌的，不好的；waterborne a.水媒的，水传播的；cholera n.霍乱；enteric a.肠的；typhoid n.伤寒；commission v.委任，（交付）使用，投产；strenuous a.用力的，费劲的；紧张的 carcinogenic a.致癌的；organic a.有机（物，体）的；disposal n.处置，处理，清除；anthropogenic a.源于人类活动的，人为的；pollutant n.污染物；envision v.预见，展望，想象；wastewater n.废水，污水；state-of-the-art a.现代化的；be subject to 易遭（受），易发生；fall into 陷入，开始；bring under control 把…控制起来；(be)concurrent with 与…一致；blending of…with……与…混合 **Text and Sentences** ➢ The human search for pure water supplies must have begun in prehistoric times. Much of that earliest activity is subject to speculation. Some individuals may have led water where they wanted it through trenches dug in the earth. Later a hollow log was perhaps used as the first water pipe. ➢ 人类在史前就开始寻找洁净水了。最初的寻找大部分是靠臆测。一些人或许通过挖沟槽把水引入他们用水的地方。后来，或许用空心圆木当做最初的水管。 ➢ Thousands of years probably passed before our more recent ancestors learned to build cities and enjoy the convenience of water piped to the home and drains for water-carried wastes. ➢ 我们的祖先可能用数千年时间才学会建设城市，享用管道供水和排放污物的方便。 ➢ Archaeological evidence shows the existence of latrines and drains in Neolithic dwellings and the Minoan civilization in Crete 2000 years B.C. had clay water and

	sewage pipes with flushing toilets in the houses. ➢ 考古学史料表明，新石器时代住宅中就有公共厕所和排水设施。公元前两千年，（古希腊）克里特岛的米诺斯文明社会已有用来冲刷卫生间的陶制成的给水和排水管道。 ➢ The Romans had highly developed water supply and drainage systems and their cities used large amounts of water with continuously operating fountains being a major source of supply for the majority of the population although wealthy families had their own piped supplies. ➢ 古代罗马人高度发展了给水和排水系统，富裕家庭有自己的给水管道，但是城市中大多数居民用水主要来源于连续运转的喷水池。 ➢ Large aqueducts, some of which still remain, were constructed over distances up to 80 km to bring adequate supplies of good-quality water into the cities. ➢ 他们所建造的大型输水渠（其中有些仍保留下来）长达 80 千米，用来吧大量水质好的水引入各城市。 ➢ Stone sewers in the streets removed surface water and collected the discharges from latrines for conveyance beyond the city limits. With the demise of the Roman Empire most of their public works installations fell into disuse and for centuries water supply and sanitation provisions were virtually non-existent. ➢ 街道上石砌的排水沟排走地表水，并汇集公共厕所污水输送到城区外。由于罗马帝国的灭亡，大部分这些公共工程设施不再使用了，数百年来，实际上给水和卫生设施不复存在。 ➢ In the Middle Ages, towns started to develop at important crossing points on rivers and these rivers usually provided a convenient source of water and an apparently convenient means of waste disposal. ➢ 到了中世纪，城镇开始在江河的许多交汇处发展起来，这些江河通常提供便利的水源和废物处置的途径。 ➢ Although sewers were built in the large towns they were intended solely for the removal of surfacewater and in the UK the discharge of foul sewage to the sewers was forbidden by law until 1815. ➢ 虽然在较大城镇铺设了污水管，但这些管道仅仅用来排放地表水。直到 1815 年，英国在法律上还禁止往污水管中排污水 ➢ Sanitary provisions were usually minimal: in 1579 one street in London with sixty houses had three communal latrines. ➢ 一般来说，卫生设施极少。1597 年，伦敦一条有 60 栋住宅的街道只有 3 个公共厕所。 ➢ Discharges of liquid and solid wastes from windows into the street were common and it

	is not surprising that life expectancy was less than half the current figure in the developed world. ➢ 从住户窗口向街道上抛洒液体和固体废物是司空见惯的事情，因此当时人的寿命还不到现在发达社会的一般就毫不奇怪了。 ➢ In an attempt to improve matters a law was passed in 1847 which made it obligatory in London for cesspit and latrine wastes to be discharged to the sewers. ➢ 为了改善这种情况，1847 年通过一条法律，该法律规定伦敦市内污水坑和公厕的污物必须排入下水道。 ➢ London‘s sewers drained to the Thames, from which much of the city’s water was obtained, and in addition the poor state of repair of many of the sewers allowed the contents to leak into the aquifer which was the other main source of water. ➢ 伦敦的下水道把污水排入泰晤士河，而该市大部分用水取自这条河；此外，许多下水道维修状况差，下水道中的污水渗漏到作为另一个主要水源的含水层去。 ➢ The inevitable consequences of this state of affairs were that water sources became increasingly contaminated by sewage, the Thames became objectionable to both sight and smell, and most seriously, waterborne diseases became rampant in the city. ➢ 这种状态不可避免的结果是污水日益污染水源，泰晤士河的外观和气味变得令人讨厌，更严重的是水传播疾病在城市蔓延。 ➢ In 1854, Dr. John Snow, a public-health worker in London, noted a high correlation between cholera cases and consumption of water from a well on Broad Street. ➢ 1854 年，伦敦的一名公共卫生工作者的约翰 斯诺博士注意到，霍乱疾病与饮用布罗德街上的一口水井的水有着密切关联。 ➢ Not only was cholera running rampant in the neighborhood around the well, but outbreak of the disease in other parts of the city could be traced to individuals who had occasion to drink from the Broad Street well, ➢ 不仅邻近此水井地区流行霍乱，而且城市其它地方爆发的霍乱都与病人有机会饮用该井水有关联。 ➢ which caused 10,000 deaths and provided the evidence for him to demonstrate the connection between sewage pollution of water and enteric diseases like cholera and typhoid. ➢ 此次霍乱造成上万人死亡，也为约翰·斯诺博士证明水污染与霍乱及伤寒这类肠道疾病之间存在联系提供了证据。 ➢ Public outcry resulted in the commissioning of the first major public health engineering works of modern times. Thus by 1870 waterborne outbreaks had been largely brought under control in the UK and similar developments were taking place in Western Europe and the cities of the USA.

	➢ 公众的呼声使得第一个大型的现代公共卫生工程设施交付使用。因此，到 1870 年，英国已大大控制了水媒疾病的发生。西欧和美国的城市经历了类似的发展过程。 ➢ The Industrial Revolution greatly increased the urban water demand and the late nineteenth century saw the construction of major water-supply schemes. ➢ 工业革命大大增加了城市需水量，19 世纪后期出现了主要供水系统的构筑物。 Only by continual and costly attention to water quality control has it been possible to virtually eradicate waterborne diseases from developed countries. ➢ 正是由于注重持续控制水质和增加水质控制费用，发达国家根除水媒疾病才成为可能。 ➢ Such achievements must not, however, be allowed to mask the appalling situation regarding water supply and sanitation in much of the developing world. ➢ 然而，不能用这样的成就掩盖大部分发展中国家的给水和卫生方面令人震惊的状况 ➢ The growth of population in developing countries, due to the high birth rate, is such that unless strenuous efforts to increase water supply and sanitation facilities are made, the percentage of the world‘s population with satisfactory facilities would actually decrease in the future. ➢ 由于高出生率，发展中国家人口增长相当快，以至于除非尽全力增加给水和卫生设施，不然具有这些良好设施的世界人口的比率就会减少。 ➢ In developed countries, demands for water are now fairly static and basic waste quality-control measures are well established. ➢ 在发达国家，水的需求量目前相当稳定，并确定了基本水质控制的度量标准。 ➢ However, many of the existing water-supply and sewage schemes are now relatively old so that their reconstruction will pose problems in the future. ➢ 然而，许多现存的给水和排水系统比较破旧，将来就会提出对它们重建的问题。 ➢ As knowledge of the effects of all forms of environmental pollution increases so new potential hazards appear, ➢ 随着人们对各种形式的环境污染效应认识的提高，新的潜在危险也会出现； ➢ for example there is current concern about the possible carcinogenic hazards arising from the presence of minute concentrations of some organic compounds in water. Anthropogenic, or human-induced, pollutants have overloaded our environment. ➢ 例如，人们目前关心的是由于水中某些微量有机化合物存在会产生可能致癌的危险。人类产生的污染物已经使得我们的环境处于超负荷状态。 ➢ Today the enormous demands being placed on water supply and wastewater disposal facilities have necessitated the development and implementation of far broader concepts in environmental engineering than those envisioned only a few years ago. ➢ 今天，对给水设施和处置废水设施的巨大需求已经十分有必要拓展和履行更广义的

	环境工程的理念，而不同于几年前对此概念的认识。 ➢ The standards for water quality have significantly increased concurrent with a marked decrease in raw-water quality. ➢ 原水水质明显降低已经使水质标准显著提高。 ➢ The lesson is that populations increase, but water and land resources do not. Consequently, the use and control of these resources must be nearly perfect to maintain our way of life. ➢ 以往所得到的经验是人口增加，但是水土资源并没有增加。因此，为保持我们的生活方式，必须尽可能更好地使用和控制水土资源。 ➢ Exercising this control will require the skillful blending of state-of-the art technology with a host of political, social, legal, economic, and organizational elements. It is the technology of water supply and pollution control that is the main concern of this book. ➢ 实施这种资源控制将要求现代化技术要与政治、社会、法律、经济和组织等各部门有机结合。给水和污染控制是本书关注的主要问题。
作　业	**Put the following English into Chinese:** The engineering decisions of major importance in the design of water supply schemes are those relating to ① the design period, which is the number of years during which the project will be expected to meet the community’s requirements; ② the estimates of the population and of the types and magnitudes of commercial, industrial, agricultural undertakings to be served during the design period; ③ the level of service, in terms of the rate of supply, reliability of supply and quality of water to be provided during the design period; ④ the selection of supply source; ⑤ the fixing of the capacities and operating levels of the engineering works for the storage, treatment, transportation and distribution of the water, including provisions for supply and demand and fluctuations. Reading Material: Environmental Engineering Reading Material: Hydrological Cycle
主要 参考资料	《给水排水工程与环境工程专业英语》杨维 机械工业出版社
课后自我总结分析	对自己上过的课进行回顾与评价，仔细分析自己上课的得失成败，分析自己的教学是否适合学生的实际水平，是否能有效地促进学生的发展，在哪些方面有待改进，再寻求解决问题的对策，优化教学方法和手段，丰富自己的教学经验。

课程说明

第 3 次课　　学时 2

课目、课题	Unit 2 Water Sources
教学目的 和 教学要求	讲解 Water Sources 相关专业技术词汇和术语 引导完成 Unit 2 短文的阅读 进一步剖析 Water Sources 语法特点和表述方法
重　点 难　点	Water Sources 相关专业技术词汇和术语
教学进程 （含课堂教学内容、教学方法、辅助手段、师生互动、时间分配、板书设计）	**New Words and Expressions** precipitate v.降水，n.沉淀物；catchment n.汇[集]水，流域；categorize v.把……分类；aeration n.充[通]气，曝气；saturation n.饱和，浸透；void n.空[孔]隙；hydrostatic a.（静）水压的, 流体静力学的；interstice n.空[孔，间]隙，间隔；subzone n.亚区，亚带，分区；infiltration n.渗入，渗透；hygroscopic a.吸湿的，收湿的；capillary a. n.毛细管，毛细（作用，现象）；tension n.张(拉/牵/应)力，紧张；alluvial a.冲积（层）的；stratum n.地层，岩层；overburden n.覆盖层；超载；aquiclude n.隔水层；弱透水层；aquifuge n.无水层，不透水层；coefficient n.系数；piezometric a.测压（水位）的；intermediate a.中间的 n.中间体；perforate v.穿[钻]孔，打眼；casing n.套管[筒]；screen n.格栅，筛，滤网；v.筛分；gravel n.砾石，砂砾；a function of 随…而变，…的函数；the ratio of…to……与…之比；specific yield 给水度，产水率，单位产水量；be defined as 可称为，被定义为；be expressed as 可以表示为…，可以写成…；normal to 与…正交，垂直于；be amenable to 适合于…的 **Text and Sentences** ➢ Both surface-water and groundwater are very important water sources for the supply. Rainfall, in most temperate regions, varies with respect to intensity and duration of storms and to total quantities precipitated in particular regions from month to month. ➢ 地表水和地下水是重要的供水水源。在大多数温带地区，降雨随着暴雨强度和历时而变，亦随着每月降落在特定区域内的总雨量而变。 ➢ City water supplies can be drawn directly from rivers in which an adequate flow is assured at all times. More generally, the flow of a river fluctuates and, after long periods of little or no rain over its catchment area, it may diminish to a trickle or even cease altogether. ➢ 城市供水可以从全年水量充沛的河流中直接提取。更常见的情况是河水流量波动变化，在其流域长时间降雨很少或无雨，河水会减少至细小水流甚至断流。 ➢ Where a water supply scheme depends on a river as its source, it is therefore usual for a reservoir to be created by means of a dam, with a storage capacity sufficient to maintain supply to the scheme over dry spells reckoned in mouths or years, depending on the

	variability of precipitation observed in the region. ➢ 在供水系统以河流作为水源时，通常是用筑坝方式建水库，其蓄水容量足以满足预测出的数月或数年枯水期该系统的需水量。 ➢ The sources of water which supply water from below the earth‘s surface are called sub-surface sources or ground-water sources. ➢ 地表以下的供水水源称为地下水。 ➢ Groundwater storage is considerably in excess of all artificial and natural surface storage in the United States. Groundwater distribution may be generally categorized into zones of aeration and saturation. ➢ 在美国，地下水储存量大大超过了地表人工和自然的储水量。地下水分布一般可划分为包气带和饱水带。 ➢ The saturated zone is one in which all the voids are filled with water under hydrostatic pressure. The aeration zone in which the interstices are filled partly with air and partly with water, may be subdivided into three subzones. ➢ 在静水压力作用下，饱水带中所有空隙充满水。包气带中的空隙一部分充水，一部分充气，可将其再划分成 3 个亚带。 ➢ 1.The soil-water zone begins at the ground surface and extends downward through the major root zone. Its total depth is variable and dependent on soil type and vegetation. The zone is unsaturated except during periods of heavy infiltration. ➢ 1.土壤水带，该带从地表起，向下延至树的主根带，其总深度是可变的，且与土壤类型和植被有关。该带仅在强入渗期饱水。 ➢ Three categories of water classification may be encountered in this region: hygroscopic water, which is adsorbed from the air; capillary water, which is held by surface tension; and gravitational water, which is excess soil water draining through the soil. ➢ 土壤水带中可以见到 3 种类型的水，即从空气中吸收而形成的吸湿水，靠表面力所持有的毛细水和多余土壤水通过土壤排出的重力水。 ➢ 2.The intermediate zone extends from the bottom of the soil-water zone to the top of the capillary fringe and may vary from nonexistence to several hundred feet in thickness. ➢ 2.中间带，该带从土壤水带底部延至毛细作用边缘顶部，其厚度从零变化至几百英尺。 ➢ The zone is essentially a connecting link between the near-ground surface region and the near-water table region through which infiltrating waters must pass. ➢ 实质上，该带是一个把近地表区与近地下水面区相连接的层带，入渗水必须流经此带。 ➢ 3.The capillary zone extends from the water table to a height determined by the capillary rise which can be generated in the soil. The capillary zone thickness is a function of soil

texture and may vary not only from region to region but also within a local area.

- 3.毛细作用带，此带从地下水面向上延至土壤中产生的毛细上升作用所决定的高度。毛细带厚度随土壤结构而变化，不仅不同区域毛细带厚度不同，而且同一区域也可以不相同
- The water that can be drained from a soil by gravity is known as the specific yield. It is expressed as the ratio of the volume of water that can be drained by gravity to the gross volume of the soil.
- 靠重力从土壤中流出的水通称为给水度。给水度可以表示为靠重力流出的水体积与土壤总体积之比。该值与土壤颗粒大小、形状、孔隙分布以及土壤密实程度有关。
- Values of specific yield are dependent on soil particle size, shape and distribution of pores, and degree of compaction of the soil. Average values of specific yield for alluvial aquifers range from 10% to 20%.
- 在冲积地层构成的含水层中，给水度平均值在 10%至 20%范围内变化。
- An aquifer is a water-bearing stratum or formation capable of transmitting water in quantities sufficient to permit development.
- 含水层是一个含有水的地层或者是能够传导大量水足以产水的地层。
- Aquifers may be considered as falling into two categories, confined and unconfined, depending on whether or not a water table or free surface exists under atmospheric pressure.
- 含水层可以分为承压和无压的两类，取决于在大气压力作用下是否存在一个地下水面或自由表面。
- The storage volume within an aquifer is changed whenever water is recharged to or discharged from an aquifer.
- 含水层内的储水量随着含水层接受补给或排泄而发生变化。
- For saturated, confined aquifers, pressure changes produce only slight changes in storage volume. In this case, the weight of the overburden is supported partly by hydrostatic pressure and partly by the solid material in the aquifer.
- 就饱水的承压含水层而言，改变压力使其储水体积仅仅产生轻微的变化。在这种情况下，覆盖层的重量部分由静水压力承受，部分由含水层固体物质承受。
- When the hydrostatic pressure in a confined aquifer is reduced by pumping or other means, the load on the aquifer increases, causing its compression, with the result that some water is forced from it.
- 当承压含水层中的静水压力由于抽水或其他方式而下降时，作用在含水层（骨架）上的负荷会增大，使含水层压缩，结果迫使一些水从含水层中流出。
- Decreasing the hydrostatic pressure also causes a small expansion, which in turn produces an additional release of water. For confined aquifers, the water yield is

	expressed in terms of a storage coefficient Sc. ➢ 同时，降低静水压力会产生步量膨胀，这种膨胀又使水产生进一步释放。对于承压含水层，产水量用储水系数 Sc 表示。 ➢ This storage coefficient may be defined as the volume of water that an aquifer takes in or releases per unit surface area of aquifer per unit change in head normal to the surface. ➢ 储水系数可定义为垂直于地表的水头每变化一个单位从含水层单位表面积上储存或释放的水量。 ➢ In addition to water-bearing strata exhibiting satisfactory rates of yield, there are also non-water-bearing and impermeable strata. ➢ 除了具有令人满意给水度的含水地层之外，也存在不含水的和不透水的地层。 ➢ An aquiclude is an impermeable stratum that may contain large quantities of water but whose transmission rates are not high enough to permit effective development. An aquifuge is a formation that is impermeable and devoid of water. ➢ 隔水层就是不透水层，它可以含有大量水，但它导水速率不能大到足以允许有效出水的程度。无水层是一个既不透水也不含水的地层。 ➢ Any circumstance that alters the pressure imposed on underground water will also cause a variation in the groundwater level. ➢ 引起作用于地下水的压力变化的任何事件也会引起地下水位的变化。 ➢ Seasonal factors, change in stream and river stages, evapotranspiration, atmospheric pressure changes, winds, tides, external loads, various forms of withdrawal and recharge, and earthquakes all may produce fluctuations in the level of the water table or the piezometric surface, depending on whether the aquifer is free or confined. ➢ 季节因素、河水位变化、蒸发蒸腾作用、大气压力改变、风力、潮汐、外部荷载、各种形式抽水与回灌以及地震都会使地下水位或者测压水位产生波动，这与含水层是无压的还是承压的有关。 ➢ It is important that the engineer concerned with the development and utilization of groundwater supplies be aware of these factors. He should also be able to evaluate their importance relative to the operation of a specific groundwater basin. ➢ 重要的是，从事地下水给水开发和利用的工程师要知晓这些影响因素，同时他应该有能力针对与某特定地下水流域有关的这些因素的重要性进行评价。 ➢ The rate of movement of water through the ground is of an entirely different magnitude than that through natural or artificial channels or conduits. ➢ 水流经地下的运动速率与水流经天然或人工渠道以及管道的速率完全不在一个数量级上. ➢ Typical values range from 5 ft/day to a few feet per year. The collection of groundwater is accomplished primarily through the construction of wells or infiltration galleries

	➢ 其值一般介于每日 5 英尺至每年几英尺之间。聚集地下水主要通过建造水井或渗水廊道来完成。 ➢ Numerous factors are involved in the numerical estimation of the performance of these collection works. Some cases are amenable to solution through the utilization of relatively simple mathematical expressions. ➢ 定量评价这些集水构筑物工况涉及许多因素。有些情况适合用较简单的数学表达式得出解 ➢ Other cases can be solved only through graphical analysis or the use of various kinds of models. ➢ 其他情况只有通过图解分析或运用各种模型加以解决. ➢ A well system may be considered to be composed of three elements: the well structure, the pump, and the discharge piping. ➢ 一个井系统可以认为是由 3 部分构成，包括井结构、水泵和排水管线。 ➢ The well itself contains an open section through which flow enters and a casing through which the flow is transported to the ground surface. ➢ 水井本身包括使地下水流入井内的孔口段和把地下水输送到地表的井壁管 ➢ The open section is usually a perforated casing or a slotted metal screen that permits the flow to enter and at the same time prevents collapse of the hole. Occasionally gravel is placed at the bottom of the well casing around the screen. ➢ 孔口段通常是一段带有圆孔的井壁管或条孔金属滤网，可让水流流人，同时防止井孔坍陷。 ➢ When a well is pumped, water is removed from the aquifer immediately adjacent to the screen. Flow then becomes established at locations some distance from the well in order to replenish this withdrawal. ➢ 有时在井壁管底部围绕滤网放入砾石。当井抽水时，紧靠滤网处含水层中的水被排走。于是，在离井一段距离的地方形成水流，以便补充这部分抽出水量。 ➢ Owing to the resistance to flow offered by the soil, a head loss is encountered and the piezometric surface adjacent to the well is depressed. ➢ 由于土壤对水流动有阻力，会出现水头损失，井附近的测压表面会下降， ➢ This is known as the cone of depression. The cone of depression spreads until a condition of equilibrium is reached and steady-state conditions are established. ➢ 通常称之为降落漏斗。直到满足平衡条件且形成稳定状态，降落漏斗才停止扩展。
作　业	**Exercises** 1.Answer the following questions in English according to the text: （1）Draw a profile (断面) to show the distribution and categories of groundwater. （2）Why are the reservoirs built?

	2. Put the following English into Chinese: Water is stored and transmitted through the hydrologic cycle. The water is held temporarily in, and can therefore be drawn from the groundwater system, ponds, lakes, and stream channels. During dry weather the drainage of these subsystems of the hydrologic cycle provides the supply upon which all human endeavor depends. It needs to be stressed that surface and groundwater supplies are related. Water can flow from one subsystem to the other, and the use or disruption of one component can impair (损害，减少) the value of the other. Reading Material: Surface Water Reading Material: Groundwater Recharge
主要 参考资料	《给水排水工程与环境工程专业英语》杨维 机械工业出版社
课后自我总结分析	对自己上过的课进行回顾与评价，仔细分析自己上课的得失成败，分析自己的教学是否适合学生的实际水平，是否能有效地促进学生的发展，在哪些方面有待改进，再寻求解决问题的对策，优化教学方法和手段，丰富自己的教学经验。

课程说明

第 4 次课　　学时 2

课目、课题	Unit 3 The Property of Water
教学目的 和 教学要求	讲解 The Property of Water 相关专业技术词汇和术语 引导完成 Unit 3 短文的阅读 进一步剖析 The Property of Water 语法特点和表述方法
重　点 难　点	The Property of Water 相关专业技术词汇和术语
教学进程 （含课堂教学内容、教学方法、辅助手段、师生互动、时间分配、板书设计）	**New Words and Expressions** tannin n.丹宁酸；backwater n.回水；slough n.泥坑，沼泽；settleable a.可沉降的；clarity n.透明度，澄清度；threshold n.临界，阈限；solvent a.有溶解力的，可溶解的，n.溶剂；fluoride n.氟化物；nutrient a. n.营养素；parameter n.参数；filtration n.过滤（作用）；ion n.离子；alkalinity n.碱度；alkaline a.碱性的；bicarbonate n.碳酸氢盐，重碳酸盐；carbonate n.碳酸盐；hydroxide n.氢氧化物；cation n.阳离子；multivalent a.多（化合）价的；calcium n.钙；magnesium n.镁；sedimentary a.沉淀[积]物的，水成的；igneous a.火成的；intake n.吸入；进水（口）；humic a.腐殖（质）的；halogenate v.卤化；加卤，卤合；biodegradable a.可生物降解的；refractory a.难（生物）降解的，难处理的；耐熔性的；microbial a.微生物的，细菌的；trace n.痕量；pathogen n.病原体，致病菌；aquatic a.水[生栖，中]的；purity n.纯净，纯度；protozoan.（pl.）原生动物；parasitic a.寄生的；coliform a.大肠菌的；indicatororganism 指示生物 **Text and Sentences** ➢ Physical characteristics of water. ➢ Most of our impressions of water quality are based on physical rather than on chemical or biological characteristics. ➢ 水的物理特性 ➢ 我们对水质的大部分印象是基于物理的而不是化学或生物特性。我们期望水是洁净、无色、无味的。 ➢ We expect water to be clear, colorless, and odorless. Most natural waters are at best cloudy; they are often colored by tannins and other organic materials picked up from decaying plants; and backwaters, sloughs, and swamps are noted for their characteristic odors. ➢ 大多数天然水体至好也不过是混浊的，腐烂植物中的丹宁酸和其他有机物常常使水体着色，滞水、泥坑和沼泽以其特有的气味而闻名。 ➢ Common analyses used to assess the physical impurities in water and wastewater are reported in Table 3.1. Quantitative measurement of these characteristics is necessary for the determination of water quality.

	➢ 表 3.1 给出用于评价水和废水中物理杂质的常见分析项目。为确定水质，有必要定量测定这些物理性质。 ➢ Chemical characteristics of water ➢ Water has been called the universal solvent, and chemical characteristics are related to the solvent capabilities of water. ➢ 水的化学特性 ➢ 水被称为万能溶剂，其化学特性与水的溶解能力有关。 ➢ Chemical measures of water quality include analysis for the presence of specific ions such as calcium, magnesium, and lead. ➢ 水质的化学检测包括对一些特殊离子的分析，如钙、镁和铅。 ➢ Total dissolved solids (TDS), alkalinity, hardness, fluorides, metals, organics, and nutrients are chemical parameters of concern in water-quality management. Most of the common water quality measures reflect combinations or interactions between ions. ➢ 总溶解固体、碱度、硬度、氟化物、金属、有机物和营养素是水质处理中重要的化学参数。大部分常规的水质检测反映离子之间的化合作用或相互作用。 ➢ TDS result from the solvent action of water on solids, liquids, and gases. The material remaining in the water after filtration for the SS analysis is considered to be dissolved. ➢ 总溶解固体是由于水对固体、液体和气体的溶解作用而形成的。悬浮固体过滤后仍存在于水中的物质被认为是溶解性的。 ➢ Alkalinity is defined as the quantity of ions in water that will react to neutralize hydrogen ions.(1) Alkalinity is thus a measure of the ability of water to neutralize acids. ➢ 碱度可定义为水中将与氢离子发生中和反应的离子量，因而碱度就是衡量水中和酸度能力的标准。 ➢ By far the most common constituents of alkalinity are bicarbonate (HCO3-), carbonate (CO32-), and hydroxide (OH-). ➢ 碱度最常见成分是碳酸氢盐、碳酸盐和氢氧化物。 ➢ The principal objection to alkaline water, however, is the reactions that can occur between alkalinity and certain cations in the water. ➢ 然而，碱性水的主要缺点是碱度与水中某些阳离子之间能发生反应。 ➢ The resultant precipitate can foul pipes and other water-systems appurtenances. Hardness is defined as the concentration of multivalent metallic cations in solution. ➢ 其产生的沉淀物会弄污管子和水系统其他附属设备。硬度是指溶液中多价金属阳离子的浓度 ➢ It may be represented by the sum of the calcium and magnesium ions because others are usually found in much smaller quantities than calcium and magnesium. ➢ 可以用钙和镁离子总和来表示，这是因为其他离子含量通常比钙和镁离子少得多的

	缘故。 ➢ Generally associated in nature with a few types of sedimentary or igneous rocks, fluoride is seldom found in appreciable quantities in surface waters and appears in groundwater in only a few geographical regions. ➢ 一般来讲，氟化物实际上与几种类型的沉积岩或火成岩有关，它很少以可观的数量存在于地表水中，仅出现于少数地理区域的地下水中。 ➢ Fluoride is toxic to humans and other animals in large quantities, while small concentrations can be beneficial. ➢ 氟化物含量大对人类和其他动物是有毒的，而低浓度的氟化物是有益的。 ➢ Concentration of approximately 1.0 mg/L in drinking water help to prevent dental cavities in children, and excessive intakes of fluoride can result in discoloration of teeth. All metals are soluble to some extent in water. ➢ 饮用的氟化物约为 1.0mg/L 时有助于预防儿童龋齿，而过量摄入氟化物会导致牙齿变色。所有的金属某种程度上都溶于水。 ➢ While excessive amounts of any metal may present health hazards, only those metals that are harmful in relatively small amounts are commonly labeled toxic; other metal fall into the nontoxic group. ➢ 尽管任何过量的金属都会对健康产生危害，但仅有相对少数金属被列为是有毒的，其他金属归入无毒类型。 ➢ The amount of organic matter present in most natural waters is low. Typically the source of the organic matter in water is from decaying, weeds, leaves, and trees ➢ 大多数天然水体中的有机物含量较低。一般来说，水中有机物来源于腐烂、杂草、树叶和树木。 ➢ Humic acid, a high-molecular-mass compound derived from the decomposition of plant matter, is found in most surface waters. At present, most surface waters and many groundwaters also contain organic matter of anthropogenic origin. ➢ 腐殖酸是一种经植物分解衍生出来的高分子量化合物，它存在于大部分地表水体中。目前，大多数地表水和许多地下水也含有源于人类活动的有机物。 ➢ Natural organic compounds must be distinguished from organic compounds that are solely of anthropogenic origin, such as DDT or some of the more than 100,000 organic compounds synthesized since 1950. ➢ 必须把天然有机化合物和源于人类活动的有机化合物（例如：DDT 或自 1950 年以来人工合成的 10 万余种有机化合物）区分开。 ➢ The presence of organic matter in water is troublesome for many reasons, including color formation, taste and odor problems, oxygen depletion in streams, interference with water treatment processes, and the formation of halogenated compounds when chlorine

	is added to disinfect water. ➢ 基于多种原因，水中有机物的存在是一个棘手的问题，包括形成颜色、嗅味问题、河水耗氧、干扰水处理工艺和对水加氯消毒时形成卤代化合物。 ➢ Dissolved organic materials in water are divided into two broad categories: biodegradable and nonbiodegradable (refractory). ➢ 水中溶解有机物可分为两大类，即可生物降解的和非生物降解的。 ➢ Biodegradable material consists of organics that can be utilized for food by naturally occurring microorganisms within a reasonable length of time. ➢ 可生物降解有机物是指在适当的时段内，能当作天然存在的微生物的食物。 ➢ The amount of oxygen consumed during microbial utilization of organics is called the biochemical oxygen demand (BOD). ➢ 微生物利用有机物期间所消耗的氧量称为生化需氧量。 ➢ Measurement of nonbiodegradable organics is usually by the chemical oxygen demand (COD) test. Nonbiodegradable organics may also be estimated from a total organic carbon (TOC) analysis. ➢ 非生物降解有机物的测定通常采用化学需氧量检测来完成，也可以根据总有机碳分析结果来估算。 ➢ Both COD and TOC measure the biodegradable fraction of the organics, so the BODu must be subtracted from the COD or TOC to quantify the nonbiodegradable organics. ➢ 化学需氧量和总有机碳都可用来计量可生物降解的那部分有机物，所以必须从化学需氧量或总有机碳中减去最终生化需氧量，以便确定非生物降解有机物的数量。 ➢ Nutrients are elements essential to the growth and reproduction of plants and animals, and aquatic species depend on the surrounding water to provide their nutrients. ➢ 营养素是植物和动物生长与繁殖所必需的元素，水生物种依赖于为它们提供营养物质的周围水体。 ➢ Although a wide variety of minerals and trace elements can be classified as nutrients, those required in most abundance by aquatic species are carbon, nitrogen, and phosphorus. ➢ 各种矿物质和痕量元素可归类为营养素，但是水生物大量需要的是碳、氮和磷。 ➢ Carbon is readily available from many sources. In most cases, nitrogen and phosphorus are nutrients that are the limiting factors in aquatic plant growth. ➢ 碳有许多来源，易于获得。大多数情况下，氮和磷是限制水生植物生长的要素。

作　业	**Exercises** 1. Answer the following questions in English according to the text: (1) Draw a profile (断面) to show the distribution and categories of groundwater. (2) Why are the reservoirs built? 2.Put the following English into Chinese: The biological characteristics of water, related primarily to the resident aquatic population of microorganisms, impact directly on water quality. Water may serve as a medium in which literally thousands of biological species spend part, if not all, of their life cycles. Aquatic organisms range in size and complexity from the smallest single-cell microorganism to the largest fish. Reading Material: Analytical Methods of Water Quality Reading Material: Water-Universal Solvent
主要 参考资料	《给水排水工程与环境工程专业英语》杨维 机械工业出版社
课后自我总结分析	对自己上过的课进行回顾与评价，仔细分析自己上课的得失成败，分析自己的教学是否适合学生的实际水平，是否能有效地促进学生的发展，在哪些方面有待改进，再寻求解决问题的对策，优化教学方法和手段，丰富自己的教学经验。

课程说明

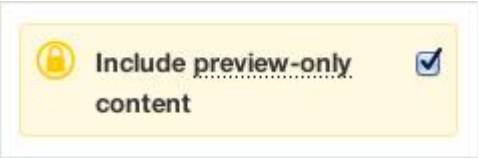
第 5 次课　　学时 2

课目、课题	Unit 4 Laws Pertaining to Water and Environment
教学目的 和 教学要求	讲解 Laws Pertaining to Water and Environment 相关专业技术词汇和术语 引导完成 Unit 4 短文的阅读 进一步剖析 Laws Pertaining to Water and Environment 语法特点和表述方法
重　点 难　点	Laws Pertaining to Water and Environment 相关专业技术词汇和术语
教学进程 （含课堂教学内容、教学方法、辅助手段、师生互动、时间分配、板书设计）	**New Words and Expressions** enforceable a.可实施的；municipal a.城市的，市政的；integrity n.完整，正直，诚实；biosolid n.生物固体；sludge n.污泥；norm n.规范，准则，（教育）标准，promulgate v.颁布，传播；watershed n.流域；jurisdictional a.权限的，管辖权的，司法（权）的；i ntegrated a.综[联]合的，完整[全]的；enact v.制定，颁布；规定；utility n.公用事业；有[实，效]用；regulatory a.管理的，（受）规章（限制）的；amendment n.修正（案）；tap n 开关，龙头，塞子；delineate v.叙述，描写；mandatory a.命令的；强迫的，义务的；susceptibilityn.敏感度[性]，灵敏度[性]；shift from……to……把……转移至……；margin of safety 安全系数[限度]，可靠性；EPA=Environmental Protection Agency（美国）环境保护署；NPDWRs 国家初级饮用水基本规程条例 **Text and Sentences** ➢ Clean Water Act　The Federal Water Pollution Control Act is the primary federal legislation that protects the nation's surface waters, such as lakes, rivers, and coastal areas. The law was originally passed in 1948, but it was totally rewritten and extended in 1972 because of the growing public outcry about the state of our nation's waters. This law became known as the Clean Water Act (CWA). It has since been revised several times, with major revisions in 1977, 1981, and 1987. It is currently under review again. ➢ The objective of the CWA is to improve and maintain water quality by restoring the physical, chemical, and biological integrity of the nation's waters. The CWA has five main elements: (1) a system of minimum national effluent standards for each industry, (2) water quality standards, (3) a discharge permit program that translates these standards into enforceable limits, (4) provisions for special wastes such as toxic chemicals and oil spills, and (5) a revolving construction program for publicly owned treatment works (POTWs). ➢ The CWA requires the EPA to establish effluent limitations for the amounts of specific pollutants that may be discharged by industrial facilities and municipal wastewater treatment plants. A system of nationwide, base-level standards has been set, but in some cases specific discharge limits can be stricter than national norms, they are then based on the intended use of the receiving water (swimming, boating, fishing, etc.). ➢ In addition, recent regulations that affect wastewater facilities design include those for

	the treatment, disposal, and beneficial use of biosolids (40 CFR Part 503, i.e. Part 503, Title 40, of Code of Federal Regulations). In the biosolids regulation promulgated in 1993, national standards were set for pathogen and heavy metal content and for the safe handling and use of biosolids. The standards are designed to protect human health and the environment where biosolids are applied beneficially to land. The rule also promotes the development of a "clean sludge". ➢ The total maximum daily load (TMDL) program was promulgated in 2000 but is not scheduled to be in effect until 2002. The TMDL rule is designed to protect ambient water quality. A TMDL represents the maximum amount of a pollutant that a water body can receive and still meet water quality standards. A TMDL is the sum of (1) the individual waste-load allocations for point sources, (2) load allocations for nonpoint sources, (3) natural background levels, and (4) a margin of safety (U. S. EPA, 2000).
作　业	**Exercises** 1. Answer the following questions in English according to the text: (1) Explain the reason that Congress enacted the SDWA. (2) What happens when the TMDL rule is implemented? 2. Put the following English into Chinese: Water quality standards have both qualitative (定性的) and quantitative aspects. The qualitative aspects include the concepts of what is a standard and what type of standards should be set. Standards are quantitatively defined as values of water quality parameters (e.g., dissolved-oxygen concentration, turbidity, acidity (酸度)) which must be met in a stream or lake to maintain a specified environment. Thus there will be a specified minimum dissolved-oxygen value in a given stream for the maintenance of trout (鲑鱼) fishery. Requirements differ from standards in that standards are based upon the existing or desired environment and, therefore, are usually tied to these conditions. Reading Material: New Horizons in Federal Regulation Reading Material: A Conceptual Approach versus the SWTR
主要 参考资料	《给水排水工程与环境工程专业英语》杨维 机械工业出版社
课后自我总结分析	对自己上过的课进行回顾与评价，仔细分析自己上课的得失成败，分析自己的教学是否适合学生的实际水平，是否能有效地促进学生的发展，在哪些方面有待改进，再寻求解决问题的对策，优化教学方法和手段，丰富自己的教学经验。

课程说明

第 6 次课　　学时 2

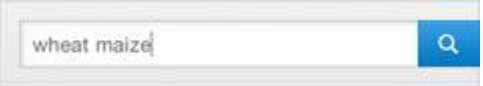
课目、课题	数据库使用，查找专业文献，制作英文海报
教学目的 和 教学要求	让学生了解外文数据库使用方法，具备独立查找相关外文文献能力 学习海报制作方法、要点，为将来专业学习及研究奠定基础
重　点 难　点	相关专业技术词汇和术语
教学进程 （含课堂教学内容、教学方法、辅助手段、师生互动、时间分配、板书设计）	**How to use database?** **1.Search Tips** By default, searches on our site will return only results containing all words entered into the search box, without case sensitivity or spell-checking, and without regard to your access rights to the content. • Narrowing your results • Start a new search • Language and stemming • Phrase match "" • Operators • Wildcards • Advanced search **(1)Narrowing your results** **1)Filter results by access** By default, search results are displayed without regard for your access rights to the content. If you would like to see only results to which you have access, uncheck the box labelled "Include preview-only content."  **2)Facets** The facet boxes that display on the left side of the search results page are sets of characteristics that describe the current set of results, with the number next to each item indicating how many results match each characteristic. Selecting an item in a facet box will refine your search results so that only those results that fit the selected item remain. Click "see all" to view and select from all facet items for a particular facet.

3)Date Published

You can narrow your results by date by clicking "Date Published" at the top of your search results and entering different values in the date boxes.

4)Search within a search

In order to search within a search, simply add keywords to any existing search terms in the keyword box at the top of the page and re-submit your search.



2.Start a new search

Search terms, facet selections, and date selections will remain as you narrow and expand a search until you click the button to "New search." Clicking this button will clear the search box and reset the search page to the default settings.

3.Language and stemming

Your search will return results that share the stem(s) of the words you enter in the search box based on your selected interface language. For example, if you have English selected as your interface language, a search for *"running"* will return matches that contain "runner", "run", "ran", and so on.

Changing the interface language will change the stemming language and can therefore change your search results.

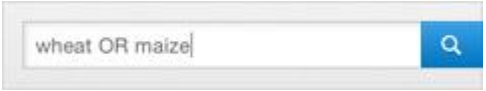
4."Phrase match"

A search with multiple terms entered within quotation marks **("")** will return only results that contain those words *or their stemmed variations* in that exact order.

5.Operators

1)The OR operator (or |)

The **OR** operator (case-insensitive) allows results to be returned even when they contain only one of the words entered. For example *wheat OR maize* will give results which include either one of the terms "wheat" or "maize".



2)The NOT operator

The **NOT** operator (case-insensitive) excludes results that contain the term following the NOT. For example *wheat NOT maize* will give results which include the term "wheat" but exclude the term "maize".

3)The AND operator (or &)

The **AND** operator (case-insensitive) provides the same results as the default on our site. If you search for *evolutionary patterns of families,* the search that will actually be carried out will be (evolutionary AND patterns AND of AND families).

The following operators are not supported in our searches: **+, –**

4)The NEAR operators

The **NEAR** operator (case-insensitive) will return results where the search term on the left is within ten words of the word to the right of the NEAR operator. For example *system NEAR testing* will return results in which the word "system" is located within ten words of the word "testing", in either order.

The **ONEAR** operator means the search terms on either side must both be near each other in the text and also appear in the order you've entered them in the search box.

You can narrow the ten-word range by including a forward slash and number along with the NEAR operator. For example *information NEAR/4 systems* will return results where the word "information" appears within four words of the term "systems".

5)Precedence

If you include multiple operators in your search, they are interpreted in the following order of precedence: NOT, OR, AND.

Operators work only on the words immediately before and after the operator (and for NOT, only the word after), so if you would like an entire phrase to be evaluated with the operator, put it in quotes.

Because two words without an operator between them are treated as an AND query by default, this means

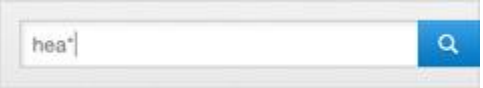
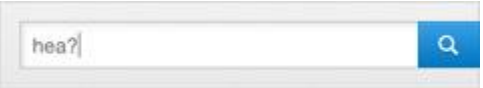
plastic bottles OR water pollution

will be interpreted as

plastic AND (bottles OR water) AND pollution

instead of as the probably intended

"plastic bottles" OR "water pollution"

	6.Wildcards Top **1)The * Wildcard** An asterisk **(*)** entered as part of a search is interpreted as a substitute for any number of letters. For example, a search for *hea** will return results containing any word starting with "hea", such as "head", "heats", "health", "heated", "heating" and so on. The wildcard search works best when there are at least 3 characters before the wildcard operator.  **2)The ? Wildcard** A question mark **(?)** entered in a search is interpreted as a substitute for any single letter. For example, a search for *hea?* will return only results that contain four-letter words starting with "hea", such as "head", "heat", "heal", and so on. The wildcard search works best when there are at least 3 characters before the wildcard operator.  **7.Advanced search** You can narrow your results by using the advanced search feature, which allows you to search for a DOI, Author or an exact phrase. It also allows you to refine your search even further by only returning results from a specific publication or date range. **How to Create an Attractive Poster** 1.What is your message? Who is your audience ? What are your objectives? 2.How to create an understandable poster? 3.How to use visual grammar （A poster is a presentation, not a paper）. 4.Auto-Evaluation Questions to test your poster: does it meet your objectives?
作　业	**Exercises** 1.Use database search papers with specific area 2.Make a poster with one of the papers
主要 参考资料	网络资源
课后自我总结分析	对自己上过的课进行回顾与评价，仔细分析自己上课的得失成败，分析自己的教学是否适合学生的实际水平，是否能有效地促进学生的发展，在哪些方面有待改进，再寻求解决问题的对策，优化教学方法和手段，丰富自己的教学经验。

课程说明

第 7 次课　　学时 2

课目、课题	Unit 5 Water-Supply System
教学目的 和 教学要求	讲解 Water-Supply System 相关专业技术词汇和术语 引导完成 Unit 5 短文的阅读 进一步剖析 Water-Supply System 语法特点和表述方法
重　点 难　点	Water-Supply System 相关专业技术词汇和术语
教学进程 （含课堂教学内容、教学方法、辅助手段、师生互动、时间分配、板书设计）	**New Words and Expressions** aerate v.曝气，充气；disinfect v.消毒，杀菌；ozone n.臭氧；ultraviolet a.紫外（线）的；microorganism n.微生物；calcium n.钙；magnesium n.镁；iodine n.碘；fluorine n.氟；goiter n.甲状腺肿；hydrant n.消火栓；assume v.假定，认为；chalk n.白垩；comp ressor n.压气[缩]机；limestone n.石灰岩；formation n.地层，岩层；interfere with 影响，妨碍；reserve…for…储备…供…之用；exchange…for…把…换成…；check with…以…校核，同…一致 **Text and Sentences** ➢ A complete water supply system is often known as a water- works(as shown in Fig 5-1). Sometimes the term is specifically applied to pumping stations, treatment stations, or storage facilities. ➢ 一个完整的给水系统通常被称为供水工程（如图 5-1）。这个术语有时专门用于泵站、处理站或储水设施。 ➢ Storage facilities are provided to reserve extra water for use when demand is high and, when necessary, to help maintain water pressure. ➢ 储水设施用来储存高峰用水时所需的超额水量；如果必要，储水设备也有助于稳定水压。 ➢ Treatment stations are places in which water may be filtered to remove suspended impurities, aerated to remove dissolved gases, or disinfected with chlorine, ozone, ultraviolet light, or some other agent that kills harmful bacteria and microorganisms. ➢ 设置处理站可将水过滤去除悬浮杂物，曝气去除溶解气体，或者用氯、臭氧、紫外光或其他某种药剂消毒以杀死有害细菌和微生物。 ➢ Sometimes hard water is softened by a process that exchanges dissolved calcium and magnesium salts for sodium salts, which do not interfere with soap. ➢ 有时，硬水还要采用钠盐交换溶解的钙、镁盐的处理工艺来加以软化，这样处理后的水对肥皂没有干扰作用。 ➢ Salts of iodine and fluorine, which are considered helpful in preventing goiter and tooth decay, are some times added to water in which they are lacking. ➢ 有时候要向缺碘盐和氟盐的水中投加这两种盐类，因为它们有助于防止甲状腺肿大

	和龋齿。 ➢ Not all water supply systems are used to deliver drinking water. Systems used for purposes such as irrigation and fire fighting operate in much the same way as systems for drinking water, but the water need not meet such high standards of purity. ➢ 不是所有的给水系统都用来提供饮用水的。用于诸如灌溉和消防目的供水系统，虽然其操作运行方式与饮用水供水系统的方式大体相同，但是水不必满足那样高的净化标准要求。 ➢ In most municipal systems hydrants are connected to the drinking water system except during period of extreme water shortage. ➢ 在大多数城市的给水系统中，除了非常缺水的时期外，消火栓都与饮用水系统相连通。 ➢ Because many cities draw water from the same body into which they discharge sewage, proper sewage treatment has become increasingly essential to the preservation of supplies of useful water. ➢ 由于许多城市都从该市排水的同一个水体中取水，所以适当的污水处理对于保持用水的供应显得越来越重要了。 ➢ A water supply engineering for a town usually includes a storage reservoir at the source of the supply, a pipeline from the storage reservoir to the distribution reservoir near the town, and finally the distribution pipes buried in the streets, taking the water to the houses, shops, factories, and offices. ➢ 城市供水工程通常包括一个位于水源处的蓄水库、水库至靠近城市的配水库之间的供水管道以及埋设在街道地面下的配水管，这些配水管把水输送到住宅、商店、工厂和机关。 ➢ The main equipment is thus the two reservoirs and the pipeline between them. The function of the storage reservoir is to keep enough water over one or several years to provide for all high demands in dry periods, and the distribution reservoir has the same function for the day or the week. ➢ 因此，供水工程的主要设施是两座水库和其间的管道。水库的作用是储存足够一年或几年以上使用的水量，以保证干旱期间高峰用水量。 ➢ The storage reservoir by its existence allows the supply sources to be smaller and less expensive, and the distribution reservoir similarly allows the pipeline and pumps to be smaller and cheaper than they would be if it did not exist. ➢ 配水池的作用则是保证每日或每星期的用水量。有了蓄水库可使供水水源规模较小，且费用少。同样，与没有配水池相比，有了配水池可使管道和水泵更短小，而且费用更经济。 ➢ In the United States, some of whose cities have the largest water use in the world per

	person, the average use per person varies from 200 to 5,000 litres per day, averaging some 500 litres/day/person. ➢ 按人均用水量计，美国某些城市的用水量在全世界是最高的，人均用水量为200~5000L/d，平均约为500L/（人·日）。 ➢ But it must not be assumed that colder countries will eventually reach the same level of use, because much of the highest US demand comes from the water spent in summer on air conditioning equipment and the watering of gardens. ➢ 但是不能确认为气候较冷的国家最终也要达到同样的用水水平，这是因为美国最高需水量大多是夏季空调设备和花园浇水方面所耗用的。 ➢ Water engineers must therefore study the water used per person (consumption per head) in their own country and choose a figure based on the most advanced community there. ➢ 因此，给水工程师必须研究本国的人均用水量（即人均耗水量），并根据最先进地区的情况选定一个数值。 ➢ The chosen consumption per head must be multiplied by the estimated population at the date for which the supply is being planned; some thirty years ahead or more. ➢ 所选定的人均耗水量必须乘以计划供水期所估测的人口，该计划供水期有些是30年或更长。 ➢ The supply and storage equipments must be designed to be large enough for this period since neither of them is so easily extended as the distribution system. This can be extended as the need arises and as the houses are built. ➢ 供水和储水设施不能像配水系统那样容易扩建，所以它们都必须设计得有足够的容量，以满足这一时期的需要。 ➢ Once the volume of the required yearly supply has been calculated and agreed with all concerned, including the fire department, it is important to make sure that it really is permanently obtainable from the catchment area proposed. ➢ 配水系统则可随需求增长和住宅建设而扩建。一旦计算出每年所需的供水量，并且经过包括消防部门在内的所有有关方面的认同后，确保能够真正永久地从所拟定的流域取得所需供水量就成为重要的问题。 ➢ The catchment area is the area which drains towards the supply, and the yearly amount of water drawn off to the storage reservoir cannot be more than the rainfall on the catchment-area and should usually be very much smaller. ➢ 汇水区域（或称其为流域）就是指把水汇人供水的区域，每年流入蓄水库的水量不能超过该流域的降雨量，一般比降雨量小得多。 ➢ A source of water supply may be obtained from surface water (rain) or from underground water or both. ➢ 供水水源可以是地表水（雨水）或地下水，或者两者兼用。

	➢ Both are refilled by the rainfall, the surface water by the runoff, and the springs or wells by the water which enters the ground, the infiltration water. ➢ 雨水补给地表水和地下水。地面径流补给地表水，流入地下的水即渗入水补给泉水和井水。 ➢ These two quantities, plus the evaporation water and the water used by the trees and plants, make up the total rainfall. ➢ 这两部分水量，加上蒸发水和树木及其他植物所吸收的水，构成总降雨量。 ➢ Even if the community water supply includes all the springs as well as all the surface water in the area, it still does not obtain all the rainfall because of evaporation and the needs of plant life. ➢ 即使区域给水量包括该区域内的全部地表水及泉水，但由于水的蒸发和植物生长都需要水，仍然不可能获得全部降雨量。 ➢ It is therefore important to check the rainfall records and the runoff and infiltration values with the records of the stream flows and other local water information. ➢ 因此，重要的是检查降雨记录、径流量和入渗量，并与河流流量记录及当地其它水文资料进行核对。 ➢ Infiltration water, the rainfall which enters the ground and becomes ground water, can travel for long horizontal distances, and it may pass into or out of the catchment area. ➢ 渗入水，就是渗入地下变成地下水的那部分雨水，能作长距离水平流动，可以流入或流出流域。 ➢ If the yearly water supply exceeds the yearly rainfall, the ground water level will generally fall and eventually it will become impossible to obtain the required supply. Another source will have to be found. ➢ 若年供水量大于年降雨量，地下水位一般会下降，最终就不能获得所需要的供水量，那么必须寻找另外水源。 ➢ It is not essential to build a storage or impounding reservoir if the water can be stored in the ground, and this may often be possible. ➢ 如果能将水储存在地下，就没有必要建造蓄水水库，而做到这一点常常是可能的。 ➢ In fact, in London area, where the water level in the chalk has been steadily falling for more than a century because of pumping, it has been suggested that further storage shall be not by the surface reservoirs which have been used until now, but by recharging the chalk with purified water through wells changed for the purpose. ➢ 事实上，在伦敦地区，由于持续抽取地下水，该地区白垩系地层内的水位一直持续下降了一个世纪。有人已建议增加蓄水不靠一直沿用至今的地面水库，而改用通过井注入净化了的水以补充白垩纪地层中的地下水量。 ➢ This practice of underground storage is being widely used by the gas industry in many

	countries. ➢ 这种地下储存的方法正广泛地被许多国家所采用。 ➢ Gas is sent underground by compressors through wells into a sealed underground sand, limestone, or other porous formation at a time when the gas supply is large, to be stored until the demand is large than the supply. ➢ 当煤气供大于求时，用压缩机通过井把煤气存入封闭的地下砂层、石灰岩层或其它多空地层中，直到需气量大于供气量为止。 ➢ These underground containers for gas are often hundreds of times as large as gas tank in existence and have been found to be a cheap, practical, and safe way of storing gas. ➢ 这些地下储气层的容积常常是现存气罐的数百倍，而且人们已发现这是一种廉价、实用和安全的储气方式。
作　业	**Exercises** 1. Answer the following questions in English according to the text: (1) What is a catchment area? (2) Why should it be done to check the rainfall records and the runoff and infiltration values with the records of the stream flows and other local water information? 2. Use the following 5 words/expressions to make up 5 sentences, respectively: (1) calcium (2) in much the same way as (3) hydrant (4) aerate (5) interfere with Reading Material: Distribution System Reading Material: Distribution Reservoirs and Service Storage
主要 参考资料	《给水排水工程与环境工程专业英语》杨维 机械工业出版社
课后自我总结分析	对自己上过的课进行回顾与评价，仔细分析自己上课的得失成败，分析自己的教学是否适合学生的实际水平，是否能有效地促进学生的发展，在哪些方面有待改进，再寻求解决问题的对策，优化教学方法和手段，丰富自己的教学经验。

课程说明

第 8 次课　　学时 2

课目、课题	Unit 6 Pumps
教学目的 和 教学要求	讲解 Pumps 相关专业技术词汇和术语 引导完成 Unit 6 短文的阅读 进一步剖析 Pumps 语法特点和表述方法
重　点 难　点	Pumps 相关专业技术词汇和术语
教学进程 （含课堂教学内容、教学方法、辅助手段、师生互动、时间分配、板书设计）	**New Words and Expressions** Impeller n.叶轮，涡轮，转子；volute n.蜗壳，螺旋形；casing n.外壳，壳体；diagonal a.对角（线）的；rotodynamic a.旋转动力的；mover n.发动机，马达；运动；pitcher n.水罐；meshing n.咬（啮）合；结网；lobe n.瓣（轮）；叶；凸起；ram n.夯，桩锤；synchronism n.同步；induce v.诱导，引起，导致；ejector n.喷射器[泵]；dewater v.脱[排，除，去]水；nozzle n.喷嘴[管]；sump n.（集，污，排水）坑；constricted a 狭窄的；eductor n.喷射器，排放管；trip v.断开，关闭，脱扣；hypothetical a.假设[定，想]的；homologous a.同调[系，源]的，相应[似]的；cavitation n.空穴[气蚀，空蚀]作用；kinetic a.运动的，动力（学）的；propeller pump 轴流泵，螺旋泵；prime mover 原动机；specific speed 比速 **Text and Sentences** ➢ Pump and pumping machinery serve the following purposes in water systems: (1) lifting water from its source (surface or ground), either immediately to the community through high-lift installations, or by low lift to purification works; (2) boosting water from low-service to high-service areas, to separate fire supplies, and to the upper floors of many-storied buildings; and (3) transporting water through treatment works, backwashing filters, draining component settling tanks, and other treatment units, withdrawing deposited solids and supplying water (especially pressure water) to operating equipment. ➢ Today most water and wastewater pumping is done by either centrifugal pumps or propeller pumps. How the water is directed through the impeller determines the type of pump. There is (1) radial flow in open-or closed-impeller pumps, with volute or turbine casings, and single or double suction through the eye of the impeller, (2) axial flow in propeller pumps, and (3) diagonal flow in mixed-flow, open-impeller pumps. Propeller pumps are not centrifugal pumps. Both can be referred to as rotodynamic pumps. ➢ Open-impeller pumps are less efficient than closed-impeller pumps, but they can pass relatively large debris without being clogged. Accordingly, they are useful in pumping wastewaters and sludges. Single-stage pumps have but one impeller, and multistage pumps have two or more, each feeding into the next higher stage. (2) Multistage turbine well pumps may have their motors submerged, or they may be driven by a shaft from

	the prime mover situated on the floor of the pumping station. ➢ In addition to centrifugal and propeller pumps, water and wastewater systems may include (1) *displacement pumps,* ranging in size from hand-operated pitcher pumps to the huge pumping engines of the last century built as steam-driven units; (2) *rotary pumps* equipped with two or more rotors (varying in shape from meshing lobes to gears and often used as small fire pumps); (3) *hydraulic rams* utilizing the impulse of large masses of low-pressure water to drive much smaller masses of water (one half to one sixth of the driving water) through the delivery pipe to higher elevations in synchronism with the pressure waves and sequences induced by water hammer; (4) *jet pumps or jet ejectors,* used in wells and dewatering operations, introducing a high-speed jet of air or water through a nozzle into a constricted section of pipe; (5) *air lifts* in which air bubbles, released from upward-directed air pipe, lift water from a well or sump through an eductor pipe; and (6) *displacement ejectors* housed in a pressure vessel in which water (especially wastewater) accumulates and from which it is displaced through an eductor pipe when a float-operated valve is tripped by the rising water and admits compressed air to the vessel. ➢ Pumping units are chosen in accordance with system heads and pump characteristics. The system head is the sum of the static and dynamic heads against the pump. As such, it varies with required flows and with changes in storage and suction levels. When a distribution system lies between pump and distribution reservoir, the system head responds also to fluctuations in demand. Pump characteristics depends on pump size, speed, and design. ➢ For a given speed N in revolutions per minute, they are determined by the relationship between the rate of discharge, Q, usually in gallons per minute, and the head H in feed, the efficiency E in percent, and the power input P in horsepower. For purposes of comparison, pumps of given geometrical design are characterized also by their *specific speed* N s, the hypothetical speed of a homologous (geometrically similar) pump with an impeller diameter D such that it will discharge 11 gpm against a 1-ft head. ➢ Because discharge varies as the product of area and velocity, and velocity varies as H1/2, Q varies as D2 H1/2. But velocity varies also as πDN/60. Hence H1/2 varies as DN, or N varies as H3/4Q1/2 ➢ Generally speaking, pump efficiencies increase with pump size and capacity. Below specific speeds of 1000 units, efficiencies drop off rapidly. Radial-flow pumps perform well between specific speeds of 1000 and 3500 units; mixed-flow pumps in the range of 3500 to 7500 units; and axial-flow pumps after that up to 12,000 units. For a given N, high-capacity, low-head pumps have the highest specific speeds. For double-suction

	pumps, the specific speed is computed for half the capacity. For multistage pumps, the head is distributed between the stages. This keeps the specific speed high and with it, also, the efficiency. ➢ Specific speed is an important criterion, too, of safety against cavitation, a phenomenon accompanied by vibration, noise, and rapid destruction of pump impellers. *Cavitation* occurs when enough potential energy is converted to kinetic energy to reduce the absolute pressure at the impeller surface below the vapor pressure of water at the ambient temperature. Water then vaporizes and forms pockets of vapor that collapse suddenly as they are swept into regions of high pressure. Cavitation occurs when inlet pressure are too low or pump capacity or speed of rotation is increased without a compensating rise in inlet pressure. Lowering a pump in relation to its water source, therefore, reduces cavitation.
作　业	**Exercises** 1. Answer the following questions in English according to the text: (1) What decides the kind of pump used in the water systems? (2) How do pump size and capacity promote pump efficiencies? 2. Put the following English into Chinese: A pumping station will generally consist of two parts, the substructure （底层结构）and the superstructure. While the substructure is basically a matter for engineering design, the superstructure should preferably be designed by an architect. If the substructure is divided into wet and dry wells, it is usual for the dry well to be directly under the superstructure and to have access from inside the building. Access to the wet well should be from the open air. Reading Material: Grinder Pump Sewer System Reading Material: Open Channel Flow
主要 参考资料	《给水排水工程与环境工程专业英语》杨维 机械工业出版社
课后自我总结分析	对自己上过的课进行回顾与评价，仔细分析自己上课的得失成败，分析自己的教学是否适合学生的实际水平，是否能有效地促进学生的发展，在哪些方面有待改进，再寻求解决问题的对策，优化教学方法和手段，丰富自己的教学经验。

课程说明

第 9 次课　　学时 2

课目、课题	Unit 7 Plumbing
教学目的 和 教学要求	讲解 Plumbing 相关专业技术词汇和术语 引导完成 Unit 7 短文的阅读 进一步剖析 Plumbing 语法特点和表述方法
重　点 难　点	Plumbing 相关专业技术词汇和术语
教学进程 （含课堂教学内容、教学方法、辅助手段、师生互动、时间分配、板书设计）	**New Words and Expressions** plumbing n.（卫生，自来水）管道工程，管件；epidemic n.时疫，流行病；submerged a.水下的，浸[潜，淹]没的；deteriorate v.变质，损坏；appurtenance n.附属设备，附件 practitioner n.专业人员，开业医生；uphilln.a.ad.上坡，向上；plumbing fixture 卫生设备[器具]；system of plumbing=plumbing system 室内管工系统，卫生设备系统；cross connection 交叉连接；back flow connection 回流管，倒流连接 **Text and Sentences** ➢ One of most important systems developed to protect the health of man and to provide man with a better way of life has been the system of plumbing, which is the piping of potable water to its ultimate use and the draining away of waste materials to a variety of treatment processes. ➢ (1) It is essential in our modern society to recognize that plumbing is to society what the circulatory system is to man. (2) It is a system which must function efficiently to avoid outbreaks of epidemics and to avoid chemical pollution. Good health practices require that plumbing in a community be free of cross-connections, backflow connections, submerged inlets and poor venting. It also must transport a good quality of potable water in adequate quantities in order to service our modern society. One of the great difficulties that we face as a society is that older existing plumbing may deteriorate and may create health hazards; also, repairs of plumbing may be carried out in such a way that they will create direct health hazards. (3)Plumbing is the practice, materials, and fixtures used in installing, maintaining, and altering of pipes, appliances, and appurtenances, utilized for potable water supply, sanitary or storm drainage and venting systems. (4)Plumbing does not include the drilling of water wells, installing water softening equipment, or sale of the manufacture or plumbing fixtures, appliances, equipment or hardware. Plumbing systems consist of an adequate potable water supply system, a safe adequate drainage system and ample fixtures and equipment. ➢ Public health personnel have long been concerned with cross-connections, backflow connections and submerged inlets in plumbing systems and public drinking water supply distribution systems. These cross-connections make possible the contamination of

	potable water with nonpotable water or contaminated water. Although the probability of contamination of drinking water seems to be remote, a multitude of problems definitely exist. The only proper precaution is to eliminate all the possible links and channels where potable water may be polluted. ➢ Cross-connections exist when the individual installing the plumbing is not aware of the danger and may not realize that water can reverse its direction. In fact it may even go uphill. In addition, the valves may fail or may be carelessly left open. In order to combat this problem, installers must understand the hydraulic and pollution factors which can cause environmental health hazards. They must also know what types of standard backflow prevention devices and methods are utilized and how to obtain the materials and install them properly. ➢ This text on plumbing is not meant to be an overall plumbing guide. It is not even meant to list all of the potential hazards. However, it should provide sufficient material and diagrams to help the environmental health practitioner have a better understanding of plumbing and its effects on health. ➢ The current status of the plumbing problem is very difficult to ascertain since data is lacking in this area. However, it can be assumed that plumbing systems in many areas are rapidly deteriorating because of the age of the structures. Unfortunately, about the only new thing added to plumbing in the last 75 years has been the introduction of plastic pipes. As a result of this lack of change, many individuals fail to pay adequate attention to the enormous potential hazard of disease and injury due to microbiological, chemical, or physical agents.
作　业	**Exercises** Answer the following questions in English according to the text: (1) What is the requirement of good health practices for the plumbing system? (2) Can we make sure of the current plumbing status in this area? Why? Reading Material: Drainage, Sewerage and Sewage Reading Material: Treatment Plant Design
主要 参考资料	《给水排水工程与环境工程专业英语》杨维 机械工业出版社
课后自我总结分析	对自己上过的课进行回顾与评价，仔细分析自己上课的得失成败，分析自己的教学是否适合学生的实际水平，是否能有效地促进学生的发展，在哪些方面有待改进，再寻求解决问题的对策，优化教学方法和手段，丰富自己的教学经验。

课程说明

第 10 次课　　学时 2

课目、课题	Unit 8 Wastewater Collection and Sewer Design
教学目的 和 教学要求	讲解 Wastewater Collection and Sewer Design 相关专业技术词汇和术语 引导完成 Unit 8 短文的阅读 进一步剖析 Wastewater Collection and Sewer Design 语法特点和表述方法
重　点 难　点	Wastewater Collection and Sewer Design 相关专业技术词汇和术语
教学进程 （含课堂教学内容、教学方法、辅助手段、师生互动、时间分配、板书设计）	**New Words and Expressions** trunk n.主干管；easement n.土地使用权，附属建筑物；manhole n.检查井；asbestos n.石棉；polyvinyl n.聚乙烯；asphyxiation n.窒息，闷死；vitrified a.陶化[瓷]的，上釉的，玻璃化的；vitrified clay 陶土；stormwater sewer 雨水管；intercepting sewer 截流（污水）管；drop inlet 落底式进水口；building connection 房屋连接管；junction chamber 汇流井（下水道），连接室；intersecting sewer 交叉（污水）管；right-of-way 用地（范围）；管带；ductile iron 延性铁；reinforced concrete 钢筋混凝土；prestressed concrete 预应力混凝土 **Text and Sentences** ➢ Collection of wastewater　Once used for its intended purposes, the water supply of a community is considered to be wastewater. The individual pipes used to collect and transport wastewater are called sewers, and the network of sewers used to collect wastewater from a community is known as a collection system. ➢ The three general types of collection systems commonly used in the United States are sanitary, stormwater, and combined. Often identified as separate sewers, sanitary sewers were developed to remove domestic wastes from residential areas. The flow in sanitary sewers is by gravity, pressure, or vacuum. Sewers intended solely for the collection of stormwater are known as stormwater sewers,　which are constructed to eliminate problems associated with the discharge of untreated wastewater from combined sewers into watercourse and receiving waters. ➢ (1) Combined sewers collect both domestic wastewater and stormwater, and they are seldom constructed in the United States today.The types and sizes of sewers used will vary with size of the collection system and the location of wastewater-treatment facilities. The principal types of sewers found in most collection systems are described in Table 8 and illustrated in Fig. 8-1.The principal appurtenances of sewers are manholes, drop inlets to manholes, building connections, and junction chambers. Depending on local topography, special structures may be required. Manholes are used to interconnect two or more sewers and to provide entry for sewer cleaning. Where the difference in elevation between the incoming and outgoing sewer exceeds 0.5m (1.5 ft),

	flow from incoming sewer can be dropped to the elevation of outgoing sewer with a drop inlet. As the diameter of intersecting sewers (e.g. main and trunk sewers) continues to increase as wastewater from more of the service area is collected, precast manholes can no longer used. (2)When this situation occurs, special junction chambers are constructed to connect the intersecting sewers. ➢ Design of sewer: to design sewers properly, accurate and detail maps should be available for the areas to be served. The location of streets, drainage ditches, and other features that may influence the design of the sewers should be identified. Accurate elevations are needed throughout the area to be served by the proposed sewer. Profiles are required for all existing or proposed streets, alleys, and potential right-of-way where sewers may be placed. In addition, detailed information must be available on the location of surface and subsurface utilities such as water and gas mains, electrical conduits, drain lines, and other underground structures. ➢ The following factors must be considered separately for each installation in planning and designing sewers: (1) estimation of design flow rates, (2) selection of design parameters, including hydraulic design equation, alternative sewer pipe materials, minimum sizes, and minimum and maximum velocities, (3) selection of appropriate sewer appurtenances. The principal materials used in the manufacture of sewer pipe are asbestos cement, ductile iron, reinforced concrete, prestressed concrete, polyvinyl chloride, and vitrified clay. ➢ Minimum sewer sizes are usually specified in local building codes, minimum slopes of sewers used to avoid extensive excavation where the slope of the ground surface is flat, and minimum and maximum velocities of flow in a sewer determined to prevent the deposition of sand and gravel and avoid damaging sewers, respectively.(3) The major difference of design procedure between sanitary and stormwater sewers is essentially that the quantity of stormwater to be removed from a service area is determined on the basis of a hydrological analysis
作　业	**Exercises** Answer the following questions in English according to the text: (1) What are the three general types of collection systems commonly used in the U.S.A.?T (2) What factors must be considered for each installation in planning and designing sewers? Reading Material: Storm Drainage System Reading Material: Sanitary Sewer System
主要 参考资料	《给水排水工程与环境工程专业英语》杨维 机械工业出版社

课后自我总结分析	对自己上过的课进行回顾与评价，仔细分析自己上课的得失成败，分析自己的教学是否适合学生的实际水平，是否能有效地促进学生的发展，在哪些方面有待改进，再寻求解决问题的对策，优化教学方法和手段，丰富自己的教学经验。

课程说明

第 11 次课　　学时 2

课目、课题	Unit 9 Water Treatment Process
教学目的 和 教学要求	讲解 Water Treatment Process 相关专业技术词汇和术语 引导完成 Unit 9 短文的阅读 进一步剖析 Water Treatment Process 语法特点和表述方法
重　点 难　点	Water Treatment Process 相关专业技术词汇和术语
教学进程 （含课堂教学内容、教学方法、辅助手段、师生互动、时间分配、板书设计）	**New Words and Expressions** engineer v.设计，操纵；grit n.砂砾[粒]，坚韧；feces n.排泄物，粪便；colloidal a.胶体[态]的；inorganic a.无机（物）的；pathogenic a.病原的，致病的；alga(algaepl) n.藻类；silt n.泥砂，淤泥；dioxide n.二氧化物；manganese n.锰；immiscible a.不混合的，不溶混的；supersaturation n.过饱和（作用）；hatchery n.孵卵[化]场；sterile a.无菌的，消过毒的；dieldrin n.狄氏剂（一种长效杀虫剂）；feed watern.供水，补给水；silica n.二氧化硅，硅酸[石，土]；assimilative a.同化的，吸收的；dose n.剂[药]量；suspension n.悬浮(体，液，物)；coagulation n.混凝（作用），凝聚；adsorption n.吸附（作用）；ozonation n.臭氧化（作用）；screening n.过筛，筛分[选]；筛屑；flocculation n.絮凝（作用）；oxidation n.氧化（作用）；deaeration n.除气[氧]，脱气[氧]；osmosis n.渗透（作用）；distillation n.蒸馏（作用） **Text and Sentences** ➢ Over the years, a variety of methods have been developed for the treatment of water. In most situations, a combination or sequence of methods will be needed. ➢ 多年来，已经研究出各种水处理方法。大多数情况下，需要把这些处理方法联合使用或按顺序使用。 ➢ The specific sequence required will depend on the quality of the untreated water and the desired quality of the product. ➢ 所要求的具体处理顺序取决于未处理水水质和所期望达到的产品水水质。 ➢ Although treating water is relatively inexpensive on a per-cubic-meter basis, there is little opportunity to modify water quality directly in most natural systems such as streams, lakes, and groundwaters because of the large volumes involved. ➢ 虽然处理水按每立方米计算相对便宜，但却不可能直接对大部分自然水体的水质进行改善，例如河流、湖泊和地下水，这是因为其水量太大了。 ➢ Rather, what is done is to treat the water used for public water supplies and to treat wastewater before it is returned to the environment in engineered systems. ➢ 而我们所要做的就是处理用于公共给水的那部分水，以及在污水返回环境之前在所设计的系统中对其进行处理。 ➢ A wide variety of contaminants that may be found in water and wastewater were identified.Contaminants that may have to be removed from groundwater, surface water

	and wastewater to meet specific water quality objectives are identified in Table 9.1. ➢ 我们能够确认水和废水中发现的多种污染物。表 9.1 中确认的污染物是指为符合特定水质要求而必须从地下水、地表水和废水中除去的污染物。 ➢ Because of their importance, treatment methods for contaminants of anthropogenic origin are also considered. ➢ 鉴于这些污染物的重要性，也要考虑到对源于人类活动的污染物的处理方法。 ➢ The most important objective of water treatment is to produce a water that is biologically and chemically safe for human consumption. Quality requirements similar to those for domestic use will generally apply for most industrial users. ➢ 水处理最重要的目的是生产出生物性和化学性安全的人类用水。与生活用水相类似的水质要求一般适用于大多数工业用户。 ➢ In some cases, such as in the manufacture of printed circuits, even higher quality requirements may have to be met. ➢ 在某些情况下，例如制造印刷电路，其用水必须符合更高的水质要求。 ➢ Domestic water supplies must be nearly sterile and turbidity-free and should have a low TDS concentration. ➢ 生活给水必须近于无毒、无浊度，还应具有低浓度的总溶解固体。 ➢ Specific chemical species such as the hardness ions, calcium and magnesium, or toxic materials such as lead and the pesticide dieldrin must be removed. Requirements for industrial uses of water vary widely. ➢ 特殊化学成分如钙、镁硬度离子或者有毒物如铅和农药狄氏剂等必须除去。工业用水的要求差异大。 ➢ Cooling is a major industrial water use and has relatively loose requirements. Corrosion, scale formation, and bacterial growth in pipes and cooling towers are the primary concerns. Boiler feedwater is necessary in many industries. ➢ 冷却是主要的工业用水，其要求相对松。在管道和冷却塔中，腐蚀、结垢和细菌生长是主要关注的问题。锅炉供水是许多行业不可缺少的。 ➢ Because of the high temperatures and pressures in boilers, scale formation is a major problem. Boiler feedwater must be low in turbidity, dissolved oxygen, and hardness. Silica is a particular problem in boilers. ➢ 由于锅炉高温、高压，结垢是个大问题。其用水必须低浊度、低溶解氧和低硬度。二氧化硅是锅炉的一个特殊问题。 ➢ The principal contaminants found in water and the unit operations and processes used for their removal are summarized in Table 9.2. ➢ 表 9-2 归纳了水中存在的主要污染物和用于除去这些污染物的单元操作和单元工艺。

	➢ As noted there, commonly used water treatment methods are either physical operations or chemical processes. ➢ 如该表中所示，通常使用的水处理方法为物理操作或化学工艺。 ➢ Biological processes are not used because appreciable amounts of organic matter are not present in most natural waters and biological processes are not suitable in situations where contaminant concentrations are low. ➢ 由于大部分天然水体中不存在数量可观的有机物，而生物法不适合用于低浓度污染物的情况，所以不采用生物法对其进行处理。 ➢ In general, effluents from biological treatment processes do not meet source standards for domestic water supplies. ➢ 一般说来，经过生物处理法处理过的流出水并不符合生活给水的水源水标准。 ➢ However, many community water supplies contain treated effluents from upstream wastewater discharges, but dilution and the assimilative capacity of the receiving water are sufficient to make the mixture acceptable as a water supply source. ➢ 然而，许多地区的给水含有上游处理过的废水流出水，但是受纳水体的稀释和同化能力足以使该混合水体成为合格的给水水源。 ➢ Most groundwaters are clear and pathogen-free and do not contain significant amounts of organic materials. Such waters may often be used in potable systems with a minimal dose of chlorine to prevent contamination in the distribution system. ➢ 大多数地下水清澈透明且没有病原体，也不含大量有机物质。这种水常常加入极少量的氯用来预防配水系统中污染，就可以作为饮水系统中的水。 ➢ Other groundwaters may contain large quantities of dissolved solids or gases. When these include excessive amounts of iron, manganese, or hardness, chemical and physical treatment processes may be required. ➢ 其他的地下水体会含有大量溶解固体或气体。当地下水含有过量的铁、锰或硬度时，就需要采用化学和物理的方法对其进行处理。 ➢ Surface waters often contain a wider variety of contaminants than groundwater, and treatment processes may be more complex. Most surface waters contain turbidity in excess of drinking-water standards. ➢ 与地下水相比，地表水经常含有各种各样的污染物，其处理方法会更复杂。大部分地表水的浊度超过饮用水标准。 ➢ Although fast-moving streams may carry large material in suspension, most of the solids will be colloidal in size and will require chemical coagulation for removal. Depending on the geology of the watershed, hardness may or may not be a problem in surface waters. ➢ 尽管快速流动的河水可携带大颗粒悬浮物，但是大部分固体粒径相当于胶体大小，

	需要靠化学混凝作用来去除。地表水的硬度大小与其流经的流域地质条件有关，所以其硬度可以成为或者不成为一个问题。 ➢ If low levels of color and other organic materials are present, adsorption onto surface-active material, a process not significant in natural water systems, may be necessary. ➢ 若水的色度以及有机物含量低，表面活性物质的吸附作用是不可缺少的，此吸附过程在天然水系中并不显著。 ➢ A wide variety of microorganisms, some of which may be pathogenic, are also common constituents of surface waters. The important application of disinfection is the production of safe drinking water. ➢ 各种微生物，其中有些可能是病原微生物，也是地表水常见组分。消毒的重要作用是生产安全的饮用水。 ➢ A number of disinfectants are technically possible to use, but chlorine and ozone are preferred for operation and cost reasons. ➢ 从技术上讲，许多种消毒剂都是能使用的，但是考虑到操作与费用问题，氯和臭氧更好.
作　业	**Exercises** 1. Answer the following questions in English according to the text: (1) Name the treatment methods for organic matters. (2) Discuss the reason that biological processes are not used in water treatment. 2. Put the following English into Chinese: The experimental studies in water and wastewater will be divided by scale: laboratory, pilot (中试), and prototype (原型). Each scale has definite advantages and limitations. For example, flexibility of experimental studies decreases as the scale becomes larger, and usefulness of the variable values in design increases with scale. Reading Material: Ion Exchange for Nitrate Removal Reading Material: Removal of Geosmin and Methylisoborneol from Drinking Water by Adsorption on Ultrastable Zeolite-Y
主要 参考资料	《给水排水工程与环境工程专业英语》杨维 机械工业出版社
课后自我总结分析	对自己上过的课进行回顾与评价，仔细分析自己上课的得失成败，分析自己的教学是否适合学生的实际水平，是否能有效地促进学生的发展，在哪些方面有待改进，再寻求解决问题的对策，优化教学方法和手段，丰富自己的教学经验。

课程说明

第 12 次课　　学时 2

课目、课题	Unit 10 Sedimentation
教学目的 和 教学要求	讲解 Sedimentation 相关专业技术词汇和术语 引导完成 Unit 10 短文的阅读 进一步剖析 Sedimentation 语法特点和表述方法
重　点 难　点	Sedimentation 相关专业技术词汇和术语
教学进程 （含课堂教学内容、教学方法、辅助手段、师生互动、时间分配、板书设计）	**New Words and Expressions** clarification n.澄清，净化；flocculate v.絮凝，结成小团块；impurity n.杂质；不洁；dilute v. a.稀释（的），冲淡（的）；discrete a.离散的，不连续的；flocculent a.絮凝[结，状]的；settle n.使沉淀[澄清]；compacting n.压实，压制；unhindered n.无阻的，不受限制的；velocity n.速度，速率；coalesce v.聚结，凝聚；floc n.(浮悬的)絮状物[体]；subsidence n.下沉，沉淀；plot v.绘制，划曲线；coordinate a. n.坐标；interparticle a. n.颗粒之间；coalescence n.聚结，凝聚；interface n.分界面；supernatant n. a.上层清液；porosity n.孔隙度[率]；多孔结构；weir n.堰，(导流)坝；scraper n.刮泥机，刮削器；flight n.链[刮，条]板；hydrostatic a.流体静力(学)的；hopper n.进[贮]料斗，漏斗；overflow n. v.溢流；size v.量尺寸，依一定尺寸制造；homogeneous a.均匀[质]的，单一的；homogeneous a.均匀[质]的，单一的；interface n.界面；sludge-blanket（悬浮）污泥层；suffer from 遭受…（损害）；具有…（缺点）；strain out 滤出[掉]；the concentration of…into…把…浓缩成…；be offset by 为…所抵消 **Text and Sentences** ➢ Sedimentation (clarification) is the removal of solid particles from suspension by gravity. In water treatment, the common application of sedimentation is after chemical treatment to remove flocculated impurities and precipitates. ➢ 沉淀（澄清）是靠重力去除悬浮液中的固体颗粒。在水处理中，通常做法是水先经过化学处理之后，再经沉淀去除絮凝状的杂质和沉淀物。 ➢ In wastewater processing, sedimentation is used to reduce suspended solids in the influent wastewater and to remove settleable solids after biological treatment. ➢ 在废水处理中，沉淀使流入的废水中悬浮固体减少，去除经过生物处理之后的可沉降固体。 ➢ Sedimentation processes are classified into four categories — type I, type II, zone, and compression — depending on the concentration of the suspension and the character of the particles. ➢ 沉淀过程分为 4 种类型，即 I 型沉淀、Ⅱ型沉淀、成层沉淀和压缩沉淀。 ➢ 沉淀类型与悬浮液浓度和颗粒特征有关。 ➢ Type I and type II are clarification of dilute suspensions, the difference being that type I consists of essentially discrete particles whereas type II deals with hindered settling of flocculent materials.

	➢ I 型和Ⅱ型沉淀均是稀悬浮液的澄清，两者不同之处是 I 型沉淀实质上是指离散颗粒沉淀，而Ⅱ型沉淀是絮状物的受阻沉淀。 ➢ Zone settling describes a mass-settling process of flocculent materials in higher concentrations than type II. ➢ 成层沉降是指比Ⅱ型沉淀浓度高的絮状物的成块沉降过程 ➢ Compression results when the concentration increases to the point where particles are in physical contact with one another and supported partially by the compacting mass. ➢ 当浓度增加到颗粒之间实际相互接触，且颗粒有一部分靠压实体支撑的时候形成压缩沉淀。 ➢ Type I sedimentation is gravity separation of nonflocculating discrete particles (ones that retain their individual characteristics) in a dilute suspension. ➢ I 型沉淀是稀悬浮液中未絮凝的离散颗粒（这些颗粒保持它们的单体特征）的重力分离。 ➢ Under such circumstances the settling is unhindered and a function only of fluid properties and the characteristics of the particle. A discrete particle settling in water accelerates until the drag force reaches equilibrium with the driving force; the settling velocity then becomes constant. ➢ 在这种情况下，沉降不会受阻，只是随流体性质和颗粒特征而变化。水中离散颗粒的沉降速度加快，直到阻力与推力达到平衡为止；然后沉降速度变为恒定。 ➢ Since equilibrium is reached rapidly, this terminal settling velocity is the parameter of interest in type I sedimentation. ➢ 由于迅速达到平衡，其未沉降速度是 I 型沉降的重要参数。 ➢ In type II sedimentation, the settling character of a dilute suspension of flocculating solids differs from that of discrete particles because of the flocculating properties of the suspension. ➢ 在Ⅱ型沉淀中，悬浮液具有絮凝性，所以含絮凝体的稀悬浮液沉淀特征与离散颗粒沉降特征不同 ➢ In this case, heavier solids having greater settling velocities overtake and coalesce with smaller, lighter solids to form still larger floc with increasing rates of subsidence. ➢ 在这种情况下，具有较快沉降速度的较重固体追上较小又较轻的固体，并且与其聚结成更大的沉降速度加快的絮体。 ➢ The opportunity for contact among the settling solids increases with depth. As a result, removal of suspended solids depends not only on the clarification rate but also on the depth of the tank, which is an important difference between type I and type II sedimentation. ➢ 沉降固体之间的接触机会随深度而增多。因此，去除悬浮固体不仅取决于沉淀速度

	，而且与沉淀池的深度有关。这是 I 型与 II 型沉淀之间的一个重要差异。 ➢ No mathematical relationship exists to state the influence of flocculation; therefore, settling-column analyses are required to evaluate this type of sedimentation. ➢ 表示絮凝作用影响的数学关系式不存在，因而需要用沉降柱分析来计算这种类型的沉淀。 ➢ The standard method for a settling-column test is to place a suspension in a column that has sampling ports at various depths and to allow sedimentation under quiescent conditions. ➢ 沉降柱试验的标准方法是在柱内放置悬浮液，在该柱的不同深度处设有取样口，在静置状态下发生沉淀。 ➢ Samples are withdrawn at selected time intervals from different depths. The concentrations of suspended solids are determined in these samples, and the data are used to compute the percentages of solids removed. ➢ 以选定的时间间隔从不同深度处取样，利用这些水样确定悬浮固体浓度，并应用这些数据计算去除固体的百分比。 ➢ The values are plotted as shown with each percentage recorded at the proper coordinates of depth and time. Lines representing percentages of removal are drawn through the data ➢ 取合适的深度和时间为坐标，把所记录的各百分比数值点绘出来，勾画出表示去除率的曲线图。 ➢ Zone settling is when a suspension settles as a blanket without interparticle movement, that is, individual particles of all sizes move downward at the same velocity. ➢ 区域沉淀就是悬浮体作为一个层沉淀下来，而不存在颗粒间的相对运动，也就是说各种粒径的单个颗粒以同一速度向下运动。 ➢ The coalescence of the suspended solids occurs during hindered settling of a sufficiently high concentration of flocculent particles. ➢ 在浓度相当高的絮状颗粒受阻沉降过程中，出现悬浮固体的聚结。 ➢ In observing zone settling, a distinct interface is formed between the mass of settling solids in the sludge zone and the clear supernatant above formed from the water of separation. ➢ 在观测区域沉降时，污泥层中沉降颗粒群与分离出的水体所形成的上层清液之间存在一个清晰的界面。 ➢ The settling velocity is the rate of downward movement of the sludge-blanket surface. ➢ 此时的沉降速度是指悬浮污泥层界面向下运动的速率。 ➢ In compression, consolidation of sediment at the bottom of the basin is extremely time consuming because the fluid displaced must flow through an ever-decreasing pore space between particles.

	➢ 在压缩沉淀过程中，排出的流体必须从颗粒之间逐渐缩小的孔隙中流过，所以沉淀池底部的沉淀物固结相当耗时。 ➢ The rate of settlement decreases with time, owing to increased resistance to flow of the fluid. The porosity of deposited sediment is at a maximum in the lowest portion of the sludge blanket, owing to compression resulting from the weight of supported particles above and because the consolidation time for this lowest portion is also greatest. ➢ 由于对流体流动阻力增大，沉降速度随时间而下降。在污泥层最下部，沉积下来的沉淀物孔隙度最大，这是因为压缩是上面所载粒重量的作用结果，而且最下部的固结时间也最长。 ➢ Many types of sedimentation tank can be found in practice. The horizontal tank is compact but suffers from a restricted effluent weir length unless suspended weirs are adopted. ➢ 实际上存在着许多类型的沉淀池。平流池为小型池，但是若不采用悬浮堰，它就具有限制出水堰长度的缺点。 ➢ Sludge is moved to the sump by a traveling bridge scraper which may serve several tanks or by a continuous-belt system with flights. The sludge is withdrawn from the sump under hydrostatic head. ➢ 能够用于几个沉淀池的移动桥式刮泥机或带有链板的连续带式刮泥系统可以把污泥清除到污泥槽，在静水压头作用下，污泥从污泥槽中被排走。 ➢ Circular tanks offer advantages of long weir length and simpler scraping mechanisms but are not so compact. ➢ 圆形沉淀池具有长堰和较简单的刮泥机械优点，但体积不那么小。 ➢ Hopper-bottom tanks with horizontal flow are popular on small sewage works where the extra construction cost is more than offset by the absence of any scraping mechanism. ➢ 平流斗底沉淀池普遍用于小型污水厂，该厂的额外建设费用高于刮泥机费用。 ➢ The vertical-flow hopper-bottom tank is often used in water-treatment plants and in such conditions operates with a sludge blanket which serves to strain out particles smaller than would be removed by sedimentation alone at the overflow rate employed. ➢ 竖流斗底沉淀池常用于水处理厂，它与悬浮污泥层一起运转，悬浮污泥层滤出的颗粒比单靠溢流率产生的沉淀所除去的颗粒小。 ➢ Sedimentation tanks have two functions: the removal of settleable solids to produce an acceptable output and the concentration of the removed solids into a smaller volume. ➢ 沉淀池有两种作用：去除可沉淀的固体生产合格出水和把除去的固体浓缩成较小体积。 ➢ The design of a tank must consider both of these functions and the tank should be sized on whichever of the requirements is limiting. (4) The sludge thickening function of a

	tank is likely to be important when dealing with relatively high concentrations of homogeneous solids. ➢ 设计一个沉淀池必须考虑到这两种作用，并根据限制性的必要条件确定沉淀池的尺寸。当处理较高浓度的均匀固体时，沉淀池污泥浓缩作用可能是重要的。
作　业	**Exercises** Answer the following questions in English according to the text: (1) Name the categories of sedimentation processes. (2) Discuss the functions of sedimentation tanks. 2. Put the following English into Chinese: Sedimentation tanks can be constructed in any designed configuration (构造，外形). Square units are really modifications of the circular- or radial-flow configuration. Features of importance in any configuration are the inlet structure, sludge-collection system, and outlet structure. The inlet structure should distribute the incoming flow evenly over the tank cross section. Reading Material: Coagulation and Flocculation Reading Material: Colloidal Dispersions
主要 参考资料	《给水排水工程与环境工程专业英语》杨维 机械工业出版社
课后自我总结分析	对自己上过的课进行回顾与评价，仔细分析自己上课的得失成败，分析自己的教学是否适合学生的实际水平，是否能有效地促进学生的发展，在哪些方面有待改进，再寻求解决问题的对策，优化教学方法和手段，丰富自己的教学经验。

课程说明

第 13 次课　　学时 2

课目、课题	Unit 11 Filtration
教学目的 和 教学要求	讲解 Filtration 相关专业技术词汇和术语 引导完成 Unit 13 短文的阅读 进一步剖析 Filtration 语法特点和表述方法
重　点 难　点	Filtration 相关专业技术词汇和术语
教学进程 （含课堂教学内容、教学方法、辅助手段、师生互动、时间分配、板书设计）	**New Words and Expressions** tannin n.丹宁酸；backwater n.回水；slough n.泥坑，沼泽；settleable a.可沉降的；clarity n.透明度，澄清度；threshold n.临界，阈限；solvent a.有溶解力的，可溶解的，n.溶剂；nonsettleable a.非沉降性的，不沉淀的；underlie v.位于…下面；tertiary a.第三（位，级，纪，）的；interstitial a.空[孔]隙的，缝隙间的；underflow n.槽下水流，潜流；地下水流；microscopic a.显微（镜）的，极微的；particulate n. a.细粒（的），粒子； .携带；转移[入]；suction n.吸入，吸力；负压；backwash n. v. 反冲洗;逆流冲刷；agitation n.搅拌[动]；fluidize v.使流（态，体）化；inactivation n.灭活，失活；hydraulically ad.（应用）水力原理，；用水[液]压的方法；fluidization n.流化（作用）；nonuniform a.不均匀的，非均质的；lodge v.积聚，堆积；scour v. n.洗刷；冲刷[洗]；疏浚；trough n.（水）槽；purge v. n.清洗[除]；restratify v.重新分层；stratify v.分层，成层；viscous a.粘滞的，粘性的；kinetic a.运动的,动力（学）的；superficial a.表面的；肤浅的；flowrate n.流量；in-depth filtration 深层过滤；shear off pieces of 把…剪成碎片；be attributed to 起因于，是因为；additional polymer 加成聚合物；chemical conditioning 化学调理；upward flow 上行流，上向流；be(directly)proportional to 与…成正比（例）；the resistance of M to NM 对 N 的阻力；pressure drop 压降 **Text and Sentences** ➢ Filtration is used to separate nonsettleable solids from water and wastewater by passing it through a porous medium. The most common system is filtration through a layered bed of granular media, usually a coarse anthracite coal underlain by a finer sand. ➢ 过滤采用让水和废水通过多孔介质的方式，把不可沉降的固体从中分离出去。最普通的过滤系统是让水通过成层粒状介质滤床进行过滤。滤床一般是由较细砂层的上面铺一层粗粒无烟煤组成的 ➢ Gravity granular-media filtration ➢ Gravity filtration through beds of granular media is the most common method of removing colloidal impurities in water processing and tertiary treatment of wastewater as shown in Fig 11.1. ➢ 粒状介质重力过滤 ➢ 在水处理和废水三级处理过程中，去除胶体杂质最常用的方法就是通过粒状介质滤床的重力过滤，如图 11-1 所示。 ➢ The mechanisms involved in removing suspended solids in a granular-media filter are

	complex, consisting of interception, straining, flocculation, and sedimentation. ➢ 在粒状滤料滤池中去除悬浮固体的机理是复杂的，它是由拦截、粗滤、絮凝和沉淀构成的。 ➢ Initially, surface straining and interstitial removal result in accumulation of deposits in the upper portion of the filter media. ➢ 起初表面过滤和孔隙充填使得沉积物聚集于滤料的上部。 ➢ Because of the reduction in pore area, the velocity of water through the remaining voids increases, shearing off pieces of captured floc and carrying impurities deeper into the filter bed. ➢ 由于孔隙减少，通过剩余孔隙的水流速度就会增大，从而剪碎被截获的絮状体并把杂质带人滤床深处。 ➢ The effective zone of removal passes deeper and deeper into the filter. Turbulence and resulting increased particle contact within the pores promotes flocculation, resulting in trapping of the larger floc particles. ➢ 于是，去除杂质的有效滤层位于滤池越来越深处。紊流和由此增加的孔隙内颗粒之间的接触提高了絮凝作用，进而导致截获较大的絮状颗粒。 ➢ Eventually, clean bed depth is no longer available and breakthrough occurs, carrying solids out in the underflow and causing termination of the filter run. ➢ 最后，不再有洁净的滤层而产生穿透；于是，滤池底部出水会把固体带出来，致使过滤周期结束。 ➢ Microscopic particulate matter in raw water that has not been chemically treated will pass through the relatively larger pores of a filter bed. ➢ 未经化学处理的原水中的微粒物将通过滤床较大的孔隙。 ➢ On the other hand, suspended solids fed to a filter with excess coagulant carry-over from chemical treatment produces clogging of the bed pores at the surface. ➢ 另一方面，悬浮固体进入因化学处理而含有过量混凝剂的滤池内会形成滤床表面孔隙的堵塞。 ➢ Optimum filtration occurs when impurities in the water and coagulant concentration cause "in-depth" filtration. ➢ 当水中杂质和混凝剂浓度形成“深层”过滤时，最佳过滤会出现。 ➢ The impurities neither pass through the bed nor are all strained out the surface, but a significant amount of flocculated solids is removed throughout the entire depth of the filter. ➢ 这时，杂质即没有透过滤床，也没有全部在滤层表面滤出，而是在滤池的整个厚度上除去了大量絮凝体。 ➢ Traditional filtration

	➢ A typical scheme for processing surface supplies to drinking-water quality consists of flocculation with a chemical coagulant and sedimentation prior to filtration. ➢ 传统过滤法 ➢ 处理地表水达到饮用水水质的典型系统是由用化学混凝剂形成的絮凝、沉淀和过滤构成的。 ➢ Under the force of gravity, often by a combination of positive head and suction from underneath, water passes downward through the media that collect the floc and particles. ➢ 通常在由正压水头和下部吸水头相结合的重力作用下，水向下流过捕集絮体和颗粒的滤床。 ➢ When the media become filled or solids break through, a filter bed is cleaned by backwashing where upward flow fluidizes the media and conveys away the impurities that have accumulated in the bed. ➢ 当滤料孔隙被充填或固体穿透时，用反冲洗来清洗滤床；在反冲洗过程中，上向流水使滤料流化，并带走聚集滤床内的杂质。 ➢ Destruction of bacteria and viruses depends on satisfactory turbidity control to enhance the efficiency of chlorination. ➢ 杀灭细菌和病毒取决于适当的浊度控制，进而提高氯化效率。 ➢ Direct filtration ➢ The process of direct filtration does not include sedimentation prior to filtration. The impurities removed from the water are collected and stored in the filter. ➢ 直接过滤 ➢ 直接过滤是指水体过滤之前未经沉淀处理。水中除去的杂质聚集并贮存在滤层中。 ➢ Although rapid mixing of chemicals is necessary, the flocculation stage is either eliminated or reduced to a mixing time less than 30 min. Contact flocculation of the chemically coagulated particles in the water takes place in the granular media. ➢ 虽然有必要快速混合化学药剂，但絮凝阶段可略去或者混合时间减为少于 30 分钟。水中用化学方法凝集的颗粒接触絮凝发生在粒状滤料内。 ➢ Successful advances in direct filtration are attributed to the development of coarse-to-fine multimedia filters with greater capacity for "in-depth" filtration, improved backwashing systems using mechanical or air agitation to aid cleaning of the media, and the availability of better polymer coagulants. ➢ 直接过滤的成功进行归于以下原因，包括研制有着较强“深层”过滤能力的由粗细多层滤料构成的滤池，改进的反冲洗系统采用机械或空气搅动有助于清洗滤料，以及使用更佳的聚合物混凝剂。 ➢ Surface waters with low turbidity and color are most suitable for processing by direct filtration as shown schematically in Fig. 11.2.

	➢ 如图 11-2 所示，低浊度和低色度的地表水体最适合采用直接过滤处理。 ➢ Based on experiences cited in the literature, waters with less than 40 units of color, turbidity consistently below 5 units, iron and manganese concentrations of less than 0.3 and 0.05 mg/l, respectively, and algal counts below 2000/ml can be successfully processed. ➢ 据文献资料中引用的以往经验表明，地表水体色度小于 40 个单位，浊度始终低于 5 个单位，铁和锰浓度分别小于 0. 3mg/L 和 0.05mg/L，藻类计数低于 2000 个/mL ➢ Operational problems in direct filtration are expected when color exceeds 40 units or turbidity is greater than 15 units on a continuous basis. ➢ 采用直接过滤处理会收到令人满意的效果。当色度连续超过 40 个单位或浊度连续大于 15 个单位时，直接过滤中会出现操作问题。 ➢ Potential problems can be alleviated during a short period of time by application of additional polymer. Tertiary filtration of wastewaters containing 20-30 mg/l suspended solids following biological treatment can be reduced to less than 5 mg/l by direct filtration. ➢ 在短时间内，靠施用加成聚合物能使潜在问题得到缓解。废水用生物法处理之后，其悬浮固体达 20 一 30mg/L，对此种废水进行三级过滤时采用直接过滤法，可使其悬浮固体减少至 5 mg/L。 ➢ For inactivation of viruses and a high degree of bacterial disinfection, filtration of chemically conditioned wastewater precedes disinfection by chlorine. ➢ 为了灭活病毒和高强度杀菌，经化学调理的废水过滤应先于用氯消毒。 ➢ The feasibility of filtration without prior flocculation and sedimentation relies on a comprehensive review of water quality data. The incidence of high turbidities caused by runoff from storms and blooms of algae must be evaluated. ➢ 未经絮凝和沉淀而直接过滤的可行性取决于对水质资料的全面研究，必须估计到由暴雨径流和水华所引发的高浊度的影响程度。 ➢ Often, pilot testing is valuable in determining efficiency of direct filtration compared to conventional treatment, design of filter media, and selection of chemical conditioning. ➢ 在确定与常规处理相比较的直接过滤效率、设计滤料以及选择化学调理方法的过程中，通常中间试验是很重要的。 ➢ Backwashing ➢ Filtration can be stopped because of a low rate of filtration, passage of excess turbidity through the bed, or "air binding". ➢ 反冲洗 ➢ 滤速减慢、滤过水浊度过高或“气塞”均能使过滤停止。 ➢ As head loss increases across the bed, the lower portion of the filter is under a partial

vacuum. This negative head permits the release of dissolved gases, which tend to fill the pores of the filter, causing air binding and reducing the rate of filtration.

- 随着通过滤床的水头损失增大，滤池下部处于局部真空状态。这个负水头会使溶解气体释放出来，它们将填充于滤料的孑 L 隙中，进而产生气塞，降低滤速。
- Under average operating conditions granular-media filters are backwashed about once in 24 hr. Initial filtered water may be wasted for 3-5 min.
- 在一般运行条件下，粒状滤料滤池每隔 24 小时反冲洗一次。初滤水可排放 3~5 分钟。
- A bed is out of operation for 10-15 min to complete the clearing process. During backwashing the bed of filter media is expanded hydraulically about 50%, and the released impurities are conveyed in the wash water to the wash trough.
- 从反冲洗到正常过滤约需 10-15 分钟。反冲洗期间，在水力作用下滤床膨胀约 50%，洗出的杂质随冲洗水流人冲洗水槽内。
- Problems in backwashing of dual-media filters can result if the cleaning action is limited to wash-water fluidization.
- 如果清洗作用仅限于冲洗水流化，那么双层滤料滤池反冲洗中就会出现问题。
- Nonuniform expansion and poor scouring can result in mud balls dropping through the coarser coal media and lodging on top of the sand layer.
- 不均匀膨胀和不适当的冲刷会使泥球穿过较粗的煤滤料，并在砂层顶部堆积下来。
- Several devices have been developed to improve backwashing by increasing the scrubbing action in an expanded bed and decreasing the quantity of wash water used.
- 为了提高反冲洗效果，已经研制出若干种过滤装置，这类装置可使膨胀滤床内的冲刷作用增强，并且可减少所用的冲洗水量。
- One popular system consists of revolving agitator arms driven by nozzles that spray wash water under a pressure of 45-75 psi when submerged in the expanded media.
- 一种普及的系统是由旋转搅拌杆构成的，该旋转搅拌杆浸没在膨胀滤料中的时候，在 45~751b/in 的压力作用下喷射出冲洗水的喷嘴将其驱动。
- Another effective method of clearing dual-media filters is to use air scouring prior to water backwashing. After lowering the water level below the wash-water troughs, air is introduced to mix and scour the media. Wash water is then used to purge and restratify the media.
- 另一种清洗双层滤料滤池的有效方法是：在用水冲洗之前先使用空气冲洗。在滤池内水位降至冲洗水槽以下后，注入空气，达到搅动并冲刷滤料的目的，然后用冲洗水清洗滤料并使之重新分层。
- The granular media are thoroughly mixed in the agitated, turbulent flow of an expanded bed during backwashing. When the upward flow of wash water is stopped, the

	suspended grains settle down to form a stratified bed with the finest grains of each medium on top. ➢ 反冲洗过程中，膨胀滤床内扰动的紊流使粒状滤料完全混合。当上行流冲洗水停止时，悬浮颗粒沉降下来，形成每种滤料的最细颗粒在最上面的成层分布滤床。 ➢ In a mixed-media bed the medium of lowest density settles on top, that is, the anthracite layer above the sand bed. ➢ 在混合滤料滤床中，密度最小的滤料沉降在上面，也就是无烟煤层位于砂层之上。 ➢ Fluidization ➢ Fluidization is defined as upward flow through a granular bed at sufficient velocity to suspend the grains in the water. During the process of fluidization, the upward flow overcomes the gravitational force on the grains, and the energy loss is due to fluid motion. ➢ 流化 ➢ 流化是指穿过粒状滤床的上行流以足够大的速度使颗粒悬浮于水中。在流化过程中，上行流克服颗粒重力，而其能量损失归因于流体运动。 ➢ The viscous energy loss is proportional to the velocity of flow, and the kinetic energy loss is proportional to the square of the velocity. ➢ 粘滞性能损失与水流速度成比例，动能损失与速度的平方成比例。 ➢ The pressure loss through a fixed bed is a linear function of flowrate at low superficial velocities when flow is laminar. (The superficial velocity is the quantity of flow divided by the cross-sectional area of the filter.) ➢ 当水流为层流时，在表观速度低的条件下，某一滤床的压力损失是流量的线性函数（表面速度等于流量除以滤池的横截面积）。 ➢ As the flowrate increases further, the resistance of the grains to wash-water flow increases until this resistance equals the gravitational force and the grains are suspended in the water. ➢ 当流量进一步增加时，颗粒对冲洗水流的阻力亦增加，直到该阻力等于颗粒重力，于是颗粒悬浮于水中为止。 ➢ Any further increase in upward velocity results in additional expansion of the bed while maintaining a constant pressure drop equal to the buoyant weight of the media. ➢ 尽管保持恒定压降等于浮力，但上向流速稍有增加会导致滤床进一步膨胀。
作　业	**Exercises** 1.Answer the following questions in English according to the text: (1) Define the in-depth filtration. (2) Discuss the mechanisms involved in removing suspended solids in a granular-media filter.

	2.Put the following English into Chinese: Significant problems associated with the use of filters have been that high suspended-solids concentrations in some water supplies and most wastewaters result in short runs before backwashing or cleaning is required. Filtration of organic-containing wastes may result in the growth of biological slimes (粘液，粘泥) that not only plug (阻塞) the filter but are very difficult to remove. Filtration processes can be loosely classified as precoat filters (预涂层过滤器)or depth filters (深床过滤器). Reading Material: Filter Components Reading Material: Polishing Filtration with Ceramic Membranes
主要 参考资料	《给水排水工程与环境工程专业英语》杨维 机械工业出版社
课后自我总结分析	对自己上过的课进行回顾与评价，仔细分析自己上课的得失成败，分析自己的教学是否适合学生的实际水平，是否能有效地促进学生的发展，在哪些方面有待改进，再寻求解决问题的对策，优化教学方法和手段，丰富自己的教学经验。

课程说明

第 14 次课　　学时 2

课目、课题	Unit 12 Disinfection of Drinking Water
教学目的 和 教学要求	讲解 Disinfection of Drinking Water 相关专业技术词汇和术语 引导完成 Unit 12 短文的阅读 进一步剖析 Disinfection of Drinking Water 语法特点和表述方法
重　点 难　点	Disinfection of Drinking Water 相关专业技术词汇和术语
教学进程 （含课堂教学内容、教学方法、辅助手段、师生互动、时间分配、板书设计）	**New Words and Expressions** unpalatable a.不可口，不好吃；hypochlorous a.次氯酸的；ionize v.（使）电离（成）离子，离子化；dissociation n.离解，溶解；hypochlorite n.次氯酸盐；chloramine n.氯胺；bactericidal a.杀[灭]菌的；enzymatic a.酶的；protozoal a.原生动物的；cyst n.孢囊；enterovirus n.肠道病毒；coliform n.大肠菌；enteric a.肠（道）的；document v.（用文件，资料）证明；hepatitis n.肝炎；epidemiological a.流行病（学）的；cysticidal a.杀孢囊的；trophozoite n.滋养体、营养子；protozoan a. n.原生动物（的）；host n.宿主；parasite n.寄生虫；anhydrous a.无水的，不含水的；eductor n.喷射器；析出物；Giardiasis n.贾第虫病；Giardialamblia n.贾第虫，梨形鞭毛虫；superchlorination n.过量加氯，过量氯化（法）；dechlorination n.脱氯（作用）；thiosulfate n.硫代硫酸盐；dosage ratio 投配比率；available commercially 市场上可买到的；reducing agent 还原剂；feed M with N 给 M 加 N,向 M 供 N；and so 故，所以 **Text and Sentences** ➢ Water after filtration still contains bacterial impurities, and dissolved inorganic salts, color, taste and odour. ➢ 过滤后的水仍含有细菌杂质、、溶解的无机盐类、色度和臭味。 ➢ The process by which harmful bacteria are destroyed to make it safe for drinking is called disinfection. Chemicals used for this purpose are called disinfectants. A chemical used as a disinfectant should satisfy the following criteria. ➢ 杀灭有害细菌使饮用水安全所采用的处理工艺称为消毒。为达到此目的而使用的化学药剂称为消毒剂。用作消毒剂的化学药剂应该满足以下标准： ➢ It should be capable of destroying pathogenic organisms within the contact time available, not change the physical and chemical characteristics of water, and not leave products of reaction which will make the water toxic and unpalatable. ➢ 它应在有效接触时间内能够杀灭病原性微生物，不改变水的物理和化学特性，不留下会使水有毒和不好喝的反应产物。 ➢ Simultaneously, it should be easily available at reasonable cost, capable of leaving residual concentration to deal with small recontamination, and detected in the water by simple tests. ➢ 同时，它应当以合理价格容易买到，能留下残余浓度来处理少量再污染，以及在水

	中可用简单试验对其进行检测。 ➢ Chlorine ➢ The process of applying chlorine to water is called chlorination. This is the most commonly and widely adopted method of disinfection for public water-supply. ➢ 氯 ➢ 将氯加入水中的处理方法称为氯化。对于公共给水来说，这是最普通的、采用最广泛的消毒方法。 ➢ Chlorine gas is soluble in water, and hydrolyzes rapidly to form hypochlorous acid (HOCl). Hypochlorous acid ionizes according to the equation: HOCl ＝ H+ +OCl－. ➢ 氯气可溶于水中，并且迅速水解形成次氯酸(HOCl)。 ➢ 根据此方程 HOCl=H+ +OCl-，次氯酸电离成离子。 ➢ The dissociation rate from hypochlorous acid to hypochlorite ion is sufficiently rapid, so equilibrium is maintained even though the former is being continuously consumed. ➢ 次氯酸离解为次氯酸离子的速率相当快，即使连续耗用次氯酸，也会保持此平衡。 ➢ If a reducing agent is put into water containing free available chlorine, the unconsumed residual redistributes itself between HOCl and OCl－. ➢ 若把还原剂加入含有游离性有效余氯的水中，这种未耗尽的余氯会在次氯酸与次氯酸离子之间重新分配自己。 ➢ Chlorine and its compounds are consumed by a variety of organic and inorganic materials present in water due to its oxidizing power before disinfection is achieved. ➢ 在取得消毒效果之前，由于氯的氧化能力，存于水中的各种有机物和无机物消耗氯及氯的化合物。 ➢ Free available residual chlorine is that residual chlorine existing in water as hypochlorous acid or hypochlorite ion. ➢ 游离性有效余氯是指以次氯酸或次氯酸离子形式存在于水中的余氯。 ➢ Combined available residual chlorine is that residual existing in chemical combination with ammonia (chloramines) or organic nitrogen compounds. ➢ 化合性有效余氯是指与氨（氯胺）或有机氮化物相化合而存在的余氯。 ➢ Chlorine demand is the difference between the amount added to a water and the quantity of free and combined available chlorine remaining at the end of a specified contact period. ➢ 需氯量就是加入水中的氯量与在规定接触时间结束时仍保存下来的游离性及化合性有效氯之间的差值。 ➢ The bactericidal action of chlorine results from its strong oxidizing power on the bacterial cell's chemical structure, destroying the enzymatic processes required for life. ➢ 氯的杀菌作用是由干它对细菌细胞的化学结构具有强氧化能力，因而破坏生物所需

	的酶作用。 ➢ The rate of microbial inactivation depends on the concentration and form of the available chlorine residual, the pH and temperature of the water, and the time of contact. ➢ 微生物灭活的速率与有效余氯的浓度和形式、水的 pH 值和温度以及接触时间有关。 ➢ The power of free chlorine residual decrease with increasing pH. Bactericidal action of combined available chlorine is significantly less than that of free chlorine residual. ➢ 游离性余氯的杀菌力随 pH 增加减弱。化合性有效氯的杀菌作用明显低于游离性余氯的杀菌作用。 ➢ Hypochlorous acid is the primary disinfectant. Hypochlorite ions are somewhat less effective. ➢ 次氯酸是主要消毒剂，氯酸离子消毒效果次之。 ➢ Therefore, hypochlorites (salts of hypochlorous acid) may be used for chlorination at small installations such as swimming pools and in emergencies. ➢ 因此，在例如游泳池这类的小型设施中和应急情况下，可以使用次氯酸盐（次氯酸的盐类）进行氯化处理。 ➢ Since hypochlorites are more expensive, liquid chlorine is applied in most water treatment plants in the USA. ➢ 由于次氯酸盐价格较贵，美国的大多数水处理厂使用液氯。 ➢ Calcium hypochlorite, Ca(OCl)2, is available commercially in granular and powdered forms that contain about 70% available chlorine. ➢ 在市场上可买到的次氯酸钙(Ca (OCl)2)呈颗粒状和粉未状，含有效氯约 70%。 ➢ Sodium hypochlorite (NaOCl) is handled in liquid form at concentrations between 5% and 15% available chlorine. These salts in water solution yield the hypochlorite ion directly. ➢ 次氯酸钠(NaOCl)以液态出售，有效氯浓度为 5%~ 15%。这些盐在水溶液中直接产生次氯酸离子。 ➢ Protozoal cysts and enteroviruses are much more resistant to chlorine than are coliforms and other enteric bacteria. ➢ 原生动物孢囊和肠道病毒比大肠菌和其他肠道细菌有更强的抗氯性。 ➢ Although little evidence indicates that current water treatment practices are not adequate, considerable concern remains regarding the resistance of these potential pathogens. ➢ 尽管没有什么证据表明目前水处理实际操作有不当之处，但是有关这些潜在的病原体抗氯性仍引起人们相当的关注。 ➢ The only documented cases involve infectious hepatitis transmitted by untreated water

	supplies. Thus far, no epidemiological surveys in the United States have conclusively demonstrated transmission of protozoal or viral diseases by processed public water supplies. ➢ 仅有几份有文件证明的病例涉及到传染性肝炎是由未经处理的给水传播的。到目前为止，美国国内流行病调查结果还没有确切地证明由处理过的公共给水传播原生动物或病毒性疾病。 ➢ The minimum cysticidal free chlorine residuals after 30 min contact are in a broad range from 3 to greater than 20 mg/l; the destructive levels necessary increase with rising pH and lower water temperatures. ➢ 在接触 30 分钟之后，杀孢囊游离性余氯最低含量在 3 mg/L 至大于 20mg/L 的大范围内变化；随着 pH 值升高和水温降低，杀孢囊所需的游离性余氯含量增加。 ➢ For virus inactivation, only undissociaed HOCl appears to be effective. Studies have indicated that a hypochlorous acid residual of 0.5-1.0 mg/l is effective within 30 min, whereas more than 100 mg/l of hypochlorite is required for an equivalent effect. ➢ 对于病毒的灭活，看来只有未离解的次氯酸是有效的。研究结果已表明，0.5~1.0mg/L 的次氯酸余量在 30 分钟内是有效的，而若取得同等效果所需的次氯酸盐含量要大于 100mg/L。 ➢ Therefore, the best disinfection for surface waters is a free chlorine residual in a pH range yielding HOCl. ➢ 所以，对地表水体最有效的消毒是在可产生次氯酸的 pH 值范围内存在的游离性余氯。 ➢ Giardia lamblia has a life cycle with a reproductive trophozoite stage and a cyst stage. The disease Giardiasis caused by this protozoan is an intestinal infection resulting in diarrhea and fever that usually lasts for 3 or 4 days. ➢ 贾第虫具有包括再生滋养体原虫阶段和孢囊阶段的生命周期。由这种原生动物所引发的贾第虫病是一种导致腹泻和发烧的肠道传染病，这种病一般持续 3 或 4 天。 ➢ Hosts (an organism that is lived on by a parasite. For example, in many diseases humans are hosts to a parasitic worm) include a wide variety of domestic and wild animals in addition to humans, and thus waterborne outbreaks have occurred from the distribution of water from reservoirs located in unpopulated mountain areas. ➢ 宿主（寄生虫靠之生存的生物体。例如，在许多疾病中，人是寄生虫的宿主）除人类以外，还包括各种各样家养的和野生的动物，因而源于人口稀少山区的水库配水的水媒病已经出现了。 ➢ HSince the cysts shed by infected animals and humans are resistant to chlorine, complete water treatment with chemical coagulation, filtration, and disinfection is recommended for the removeal of cysts.

	➢ 由于被传染的动物和人排泄出的孢囊有抗氯性，所以，为去除孢囊建议采用化学混凝、过滤和消毒方法进行完整的水处理。 ➢ Well-water supplies obtained from aquifers beneath impervious strata are often not disinfected. ➢ 从不透水层下面的含水层中取出的井水供水通常不用消毒。 ➢ Since contamination can occur in the distribution system, good practice is to retain a chlorine residual to ensure a safe water supply at the consumer's faucet. The chlorine residual may be free or combined residual established by feeding anhydrous ammonia with the chlorine. ➢ 由于配水系统中会出现污染，有效的作法是保持余氯，以确保用户用水安全。余氯可以是通过给无水氨加氯所形成的游离性或化合性余氯。 ➢ Surface-water supplies from polluted rivers or impoundments are purified by chemical coagulation, filtration, and disinfection. ➢ 用受污染的河流或蓄水池的地表水供水，可以采用化学混凝、过滤和消毒的处理工艺加以净化。 ➢ Chlorine is applied after sedimentation or filtration and as the water is pumped from the treatment plant to retain the desired residual in the clear well and distribution system. ➢ 沉淀或过滤之后加氯，而从水处理厂抽出的水要保持清水井和配水系统中有适量的余氯。 ➢ Breakpoint chlorination prior to chemical coagulation is no longer common practice because of trihalomethane formation. ➢ 在化学混凝之前的折点加氯由于会形成三卤甲烷而不再常用。 ➢ Difference forms of chlorination ➢ The different forms of chlorination practice are four categories. Plain chlorination Water from deep wells, lakes, reservoirs, etc., is relatively clear with turbidity less than 30 ppm. ➢ 加氯消毒的不同形式 ➢ 不同形式的加氯消毒操作可归类为 4 种类型。（1）单纯氯化　深井水、湖泊水、水库水等较清澈．浊度小于 30ppm。 ➢ In such cases no treatment such as sedimentation, coagulation, etc., is necessary. When no other treatment except chlorination is given before supplying water to consumers, it is called plain chlorination. About 0.5 ppm of chlorine is added for disinfection of such water. ➢ 这种情况下，没必要对水进行如沉淀、混凝等的处理。在把水供给用户之前，除了对水进行加氯消毒以外，不做任何处理，此时即为单纯氯化。将大约 0. 5ppm 的氯投加到这种水中实施消毒。

	➢ (2) Superchlorination ➢ This is adopted in cases of an emergency like a breakdown or in cases of waters which are heavily polluted. ➢ (2)过量氯化 ➢ 在紧急情况下，诸如出现故障或水受到严重污染时，采用此种氯化方式。 ➢ The comparatively large doses of chlorine are used to eliminate objectionable taste or smell in drinking water. The contact period is generally 10-30 min. Excess chlorine has to be again dechlorination. ➢ 使用较大剂量去除饮用水中令人讨厌的臭味。接触时间一般为 10 一 30 分钟。过量的氯必须再进行脱氯处理。 ➢ Dechlorination ➢ When water contains excess chlorine, it gives a strong odor and taste. Then dechlorination is done to remove excess undesirable chlorine to such an extent that residual chlorine is not objectionable, usually by adding sulfur dioxide. ➢ 脱氯 ➢ 当水含有过量氯时，就会散发刺鼻的臭味。于是，进行脱氯处理来除去过量的不合乎需要的氯，使水中的余氯量适宜，一般是通过投加二氧化硫实现脱氯的。 ➢ Where sulfur dioxide is not available, in small works, sodium thiosulfate can be used. ➢ 在小型工程中，二氧化硫买不到的话，可使用硫代硫酸钠。 ➢ Break point chlorination ➢ When chlorine is added to water or sewage to disinfect them, readily oxidisable substances (e.g. divalent ions of iron and magnesium) and organic matter react first with the chlorine. ➢ 折点加氯 ➢ 当把氯投入水或污水中对其进行消毒时，易于氧化的物质（如：二价铁离子和镁离子）和有机物首先与氯发生反应。 ➢ Thereafter the chlorine reacts with ammonia to form chloramines, which may be further oxidized by more chlorine to trichloramine (nitrogen trichloride), or to nitrogen and its oxides. ➢ 然后，氯与氨反应，生成氯胺，氯胺进一步被较多氯氧化成三氯胺（三氯化氮）或氧化成氮及氮的氧化物。 ➢ The breakpoint is reached when these reactions are complete so that continued addition of chlorine then produces free residual chlorine — that is, unreacted hypochlorous acid or hypochlorite ion. ➢ 当这些反应完成时，即达到了折点，从而连续投加氯就会产生游离性余氯，也就是未反应的次氯酸和次氯酸根离子。

	➢ Effective disinfection can be achieved with 0.1 mg/l of free residual chlorine if it is present as HOCl. ➢ 若游离性余氯以次氯酸形式存在，其浓度为 0. 1mg/L，就达到了有效消毒作用。 ➢ Breakpoint chlorination is adaptable to physical-chemical treatment and has the advantages of low capital cost, a high degree of efficiency and reliability, insensitivity to cold weather, and release of nitrogen as a gas. ➢ 折点加氯适用于物化处理，具有低投资、高效率和强可靠性、对低温天气不敏感、释放氮气等优点。 ➢ The main disadvantage is that essentially all the chlorine added is reduced to chloride ion, thus contributing to dissolved-solids concentration in the treated water. ➢ 其主要缺点是投加的所有氯实质上被还原为氯离子，这样会增加处理过的水中溶解固体浓度。 ➢ Other disinfectants ➢ Ozone is an unstable isotope of oxygen, which is a powerful disinfectant and does not produce any taste or odor. ➢ 其他消毒剂 ➢ 臭氧是氧的一种不稳定同位素，它是一种强有力的消毒剂，并且不产生任何的臭味 ➢ A complete ozonation installation consists of four major units: a gas preparation system, an electric power supply, an ozone generator, and a contactor. This gas is applied to the water being treated in a mixed contact chamber designed for efficient mass transfer to dissolve the ozone. ➢ 一个完整的臭氧化装置由 4 个主要部分组成：气体配制系统、电力供应系统、臭氧发生器和接触器。将这种气体加入混合接触池内被处理的水中，该混合接触池可以为溶解臭氧进行有效质量传递。 ➢ The gas is dispersed into the water by porous stone diffusers, eductor-induced vacuum injectors, turbine mixers, or packed columns. Although a most powerful disinfectant, ozone does not provide a lasting residual in the treated water. ➢ 通过多孔石扩散器、感应喷射真空水射器、涡轮式搅拌器或填充柱，可将臭氧扩散到水中。尽管臭氧是一种非常有效的消毒剂，但它不能在处理过的水中产生持久的余量。 ➢ Therefore, secondary chlorination is recommended to establish a protective residual in the distribution system. Ozonation does not form any known health-related byproducts when applied in water processing. ➢ 因此，建议进行二次氯化处理，以便在配水系统中形成保护性余氯。当臭氧化用于水处理时，不会形成任何已知的有损健康的副产物。 ➢ Ultraviolet rays are powerful disinfectants which are produced by passing electric

	current through mercury vapor lamps. Water is allowed to flow in thin layers. ➢ 电流通过水银灯产生的紫外线是强有力的消毒剂，这时水呈薄层状流动达到消毒的目的。 ➢ Disadvantages are treatment costly, no residual disinfecting action, and ineffective when turbidity is greater than 15 ppm. Potassium permanganate is very effective in killing cholera germs but not effective for other bacteria. ➢ 其缺点是处理费用高，没有残余消毒作用，当浊度大于 15ppm 时不起作用。高锰酸钾杀灭霍乱病菌是很有效的，但对其他细菌没有效。 ➢ Widely used for disinfecting village wells, but it may produce coating on porcelain vessels and stains difficult to remove. ➢ 虽然高锰酸钾广泛用于农村水井水的消毒，但是它们会在瓷器上产生敷层和难以除去的污迹。 ➢ Iodine and bromine are good disinfectants and available in the form of pills or pellets. They may be used for swimming pools, army troops during war, etc. Not used for public water-supply. ➢ 碘和溴是良好的消毒剂，它们有片剂或丸剂，可以用于游泳池，战争期间用于部队的水消毒等，而公共给水不用它们消毒。
作　业	**Exercises** 1. Answer the following questions in English according to the text: (1) Discuss the criteria of the chemical used as a disinfectant. (2) What is the chlorine demand? 2.Put the following English into Chinese: Wastewater effluents are chlorinated to inactivate enteric bacteria and viruses to protect public health where discharges enter surface waters used for body-contact recreation and as municipal water supplies. Disinfection is accomplished by chloramines formed when the chlorine reacts with ammonia present in the wastewater. Prior to the establishment of specific biological requirements, disinfection of wastewater was empirically defined as the addition of sufficient chlorine so that a residual of 0.5 mg/l existed after 15 min. Control of chlorine dosage is extremely important for proper operation. Reading Material: Solar Collectors for Disinfection of Contaminated Water Reading Material: Aeration
主要 参考资料	《给水排水工程与环境工程专业英语》杨维 机械工业出版社
课后自我总结分析	对自己上过的课进行回顾与评价，仔细分析自己上课的得失成败，分析自己的教学是否适合学生的实际水平，是否能有效地促进学生的发展，在哪些方面有待改进，再寻求解决问题的对策，优化教学方法和手段，丰富自己的教学经验。

课程说明

第 15 次课　　学时 2

课目、课题	Unit 13 Wastewater Treatment Methods
教学目的 和 教学要求	讲解 Wastewater Treatment Methods 相关专业技术词汇和术语 引导完成 Unit 13 短文的阅读 进一步剖析 Wastewater Treatment Methods 语法特点和表述方法
重　点 难　点	Wastewater Treatment Methods 相关专业技术词汇和术语
教学进程 （含课堂教学内容、教学方法、辅助手段、师生互动、时间分配、板书设计）	**New Words and Expressions** engineer v.设计，操纵；grit n.砂砾，金属屑；feces n.排泄物，粪便；silt n.泥砂，淤泥；trace n.痕量，微量；immiscible a.不混合的，不溶混的；assimilative a.同化的，吸收的；screening n.筛选[分]；筛屑；deaeration n.除气[氧]，脱气[氧]；distillation n.蒸馏；comminution n.粉碎，破碎；intermittent a.间歇[断]的，断续的；nitrification n.硝化（作用）；denitrification n.反硝化（作用）；refractory a.不易处理的，难控制的； tertiarya.第三（级）的；electrodialysis n.电渗析；alkali n.碱；membrane n.膜，薄[隔]膜；gravimetric a.重量[力]的；encapsulation n.封装，密封；caustic n.苛性的，腐蚀性的；organometallic a.有机金属的；phosphorus n.磷；trickling filter 滴滤池，生物滤池；apply for 适合，接洽；to the extent possible 尽可能 **Text and Sentences** ➢ Wastewaters are usually classified as industrial wastewater and municipal wastewater. The former with characteristics compatible with the latter is often discharged to the municipal sewers. ➢ 通常将废水归类为工业废水和城市废水。与城市废水特征相似的工业废水往往被排人市政污水管。 ➢ Many industrial wastewaters require pretreatment to remove noncompatible substances prior to discharge into the municipal system. ➢ 许多工业废水在排入市政污水系统之前，需要进行预处理，除去与城市污水特征不相容的物质。 ➢ Characteristics of industrial wastewater vary greatly from industry to industry, and consequently, treatment processes for it also vary, although many of the processes used to treat municipal wastewater are also used in industrial wastewater treatment. ➢ 尽管许多用于处理城市污水的工艺也用于工业废水处理，但各工业行业的废水特征差异很大。因此，对不同工业废水采用的处理工艺差异也大。 ➢ A complete coverage of industrial wastewater treatment is beyond the scope of this text. ➢ 对工业废水处理的一个完整阐述超出了本书范畴。 ➢ The principal objective of wastewater treatment is to produce an effluent that can be discharged without causing serious environmental impacts. ➢ 废水处理的主要目的是生产可以排放而没有对环境造成严重影响的出水。

	➢ The principal contaminants found in municipal wastewater and the unit operations and processes used for their removal are summarized in Table 13.1. Processes and operations used in wastewater treatment are similar to those used in water treatment, except for biological methods. ➢ 表 13.1 归纳出城市污水中存在的主要污染物和用于除去这些污染物的单元操作及单元工艺。除了生物处理法，用于废水处理的工艺方法和操作与水处理所采用的类似。 ➢ The principal use of biological treatment is for the removal of easily biodegradable organic compounds, although biological processes are also used for removal of nitrogen and phosphorus in some situations. ➢ 在某些情况下，生物法也用于脱氮和除磷，但是生物处理的主要目的是去除易于生物降解的有机化合物。 ➢ A large number of biological process configurations are in use, and several combine physical operations and chemical and biological processes within the same unit. ➢ 许多生物工艺过程组合形式正在使用中；在同一处理单元中，某些组合形式联合使用物理操作、化学和生物处理法。 ➢ Serious health and environmental hazards exist in a wide variety of chemicals of anthropogenic origin that have been found in both surface waters and groundwaters. ➢ 在地表水和地下水中，已经发现各种各样源于人类活动的化学制品对人类健康和环境造成严重威胁。 ➢ The principal objectives to be met in treating contaminated groundwaters are to eliminate the health hazards and to restore, to the extent possible, the quality of the groundwater. Treatment methods for contaminated groundwaters are listed in Table 13.2. ➢ 处理受污染的地下水要达到的主要目的是消除对健康的危害，尽可能恢复地下水水质。表 13—2 列出对污染了的地下水的处理方法。 ➢ The Water Pollution Control Act of 1972 mandated the EPA to establish standards for wastewater discharges. Current standards require that municipal wastewater be given secondary treatment and that most effluents meet the conditions. ➢ 1972 年颁布的《水污染控制法》委托（美国）环境保护署制定污水排放标准。目前的标准要求城市污水应该达到二级处理，大部分排放出的污水符合此项规定。 ➢ Secondary treatment of municipal wastewater is generally assumed to include settling, biological treatment, and disinfection, along with sludge treatment and disposal. ➢ 通常认为，城市污水的二级处理包括沉淀、生物处理和消毒，以及污泥的处理与处置。 ➢ Thus, the principal components of municipal wastewater, suspended solids, biodegradable material, and pathogens should be reduced to acceptable levels through

	secondary treatment . ➢ 因此，通过二级处理之后，悬浮固体、可生物降解物质和致病菌等城市污水的主要成分能够降至允许水平。 ➢ Industrial discharges are required to treat their wastewater to the level obtainable by the "best available technology" for wastewater treatment in that particular type of industry. ➢ 由于工业行业的特殊性，要求处理工业废水达到采用"最适用工艺"处理后所能达到的水平。 ➢ The EPA regulations further define receiving stream as "effluent-limited" and "water-quality-limited". ➢ 美国环境保护署的规章进一步明确受纳水体是排污受限和水质受限的水体。 ➢ An effluent-limited stream is a stream that will meet its in-stream standards if all discharges to that stream meet the secondary-treatment and "best-available-technology" standards. ➢ 如果排放到排污受限河流的污水符合二级处理标准和"最适宜工艺"标准，此条河流就能符合河流水质标准。 ➢ Municipalities and industries discharging to effluent-limited streams are assigned discharge permits under the National Pollutant Discharge Elimination System (NPDES); these permits reflect the secondary treatment and best-available-technology standards. ➢ 对于排放污水至限排河流的城市和工业企业，要颁发给他们"国家控制污染物排放制度"要求的排放许可证；这些许可证代表着达到二级处理标准和"最适宜工艺"标准的要求。
作　业	**Exercises** 1. Answer the following questions in English according to the text: (1)Is there any difference between processes and operations used in wastewater treatment and water treatment? What is it? (2) What is the principal objective to be met in treating contaminated groundwater? Reading Material: Terminology in Wastewater Treatment Reading Material: Grit Chambers in Wastewater Treatment
主要 参考资料	《给水排水工程与环境工程专业英语》杨维 机械工业出版社
课后自我总结分析	对自己上过的课进行回顾与评价，仔细分析自己上课的得失成败，分析自己的教学是否适合学生的实际水平，是否能有效地促进学生的发展，在哪些方面有待改进，再寻求解决问题的对策，优化教学方法和手段，丰富自己的教学经验。

课程说明

第 16 次课　　学时 2

课目、课题	英语论文写作
教学目的 和 教学要求	了解英语论文的写作要求，格式
重　点 难　点	Language Characteristics Structure Reading Skill Common Mistakes
教学进程 （含课堂教学内容、教学方法、辅助手段、师生互动、时间分配、板书设计）	中英文特点： 汉语句子短，动词多，语序比较固定，讲究对称。 英语句子长，动词少，词序灵活，讲究平衡。 科技文体崇尚： 常用前置性陈述，即在句中将主要信息尽量前置，通过主语传递主要信息。 严谨周密，概念准确，逻辑性强，行文简练，重点突出，句式严整，少有变化； 清晰、准确、精练、严密 。 **Language Characteristics** ➢ 名词化结构 ➢ 被动语句 ➢ .非限定动词 ➢ 后置定语 ➢ 长句 ➢ 复合词与缩略词 1.大量使用名词化结构 科技文体要求行文简洁、表达客观、内容确切、信息量大、强调存在的事实，而非某一行为。 e.g. Topical surveys on the significance and use of print media prove that the need for print media is growing worldwide. exercise Television transmisses and recepts the images of moving objects by radio waves. Television is the transmission and reception of images of moving objects by radio waves. 2.广泛使用被动语句 科技英语中的谓语至少三分之一是被动态，这是因为： 科技文章侧重叙事推理，强调客观准确，第一、二人称使用过多，会造成主观臆断的印象。因之要尽量避免使用

	科技文章将主要信息前置，放在主语部分，这也是广泛使用被动态的主要原因 e.g. Optical density can also be calculated by using spectrophotometers. exercise We must pay attention to the working temperature of the machine. Attention must be paid to the working temperature of the machine. 3.非限定动词 科技文章要求行文简练，结构紧凑，为此： 使用分词短语代替定语从句或状语从句； 使用分词独立结构代替状语从句或并列分句； 使用不定式短语代替各种从句； 使用介词＋动名词短语代替定语从句或状语从句。 使用分词短语代替定语从句或状语从句； In a broader sense, electronic media also include in particular interactive applications: media which appear differently that depends on user intervention. In a broader sense, electronic media also include in particular interactive applications: media which appear differently depending on user intervention. 使用分词独立结构代替状语从句或并列分句； Vibrating objects produce sound waves, and each of them produces one sound wave. Vibrating objects produce sound waves, each vibration producing one sound wave. 使用不定式短语代替各种从句 Printing processes are being increasingly controlled and adjusted electronically, which leads to consistent high quality and greater productivity. As a result of Gutenberg's inspired discovery in the middle of the fifteenth century of how to produce individual, moveable type from lead alloy, it became possible to reproduce type elements economically and quickly, and thereby to reproduce books by printing. 介词＋动名词短语代替定语从句或状语从句 For expressing these effects, a mixing color model of watercolors called particle density model is introduced. Along with advertising inserts, which we come across every day in newspapers and magazines, there is a large market for leaflets and product descriptions. 4.后置定语 介词短语 形容词及形容词短语 副词 分词 定语从句

	A call for paper is now being issued. In this factory the only fuel available is coal. The air outside pressed the inside . The results obtained must be checked. The mechanical cleaning, which removes particles of toner, can be done by means of brushes and/or suction. 5.长句 为了表述一个复杂概念，使之逻辑严密，结构紧凑，科技文章中往往出现许多长句。 Rainfall, in most temperate regions, varies with respect to intensity and duration of storms and to total quantities precipitated in particular regions from month to month. 在大多数温带地区，降雨随着暴雨强度和历时而变，亦随着每月降落在特定区域内的总雨量而变。 The illuminant, among other things, is taken directly into consideration as a parameter in the reduction of spectral data to CIE color systems, so that subsequent conversions to other illumination conditions (e.g., from D50 to D65 or vice versa) are then quite impossible or at best only possible using mathematical approximations. The illuminant is taken directly into consideration as a parameter in the reduction of spectral data to CIE color systems, so that subsequent conversions to other illumination conditions are then quite impossible or at best only possible using mathematical approximations. 6.复合词与缩略词 大量使用复合词与缩略词是科技文章的特点之一； 复合词从过去的双词组合发展到多词组合； 缩略词趋向于任意构词。 feed-back反馈（双词合成名词） full-enclosed 全封闭的 Colorimeter 色度计（无连字符复合词） lab (laboratory)实验室 FM (frequency modulation)调频 AM (amplitude modulation)调幅 P.S.I. (pounds per square inch) 磅/英寸 PPI (pixel per inch) DPI (dot per inch) Science Reading Skill **Common Reading Skill** • Intensive Reading • Extensive Reading

	• Skimming Reading • Scanning Reading • Science Paper Reading Skill 1.Intensive Reading 精读要做到逐字细读，不但要了解文章的主题思想和内容，了解文章的文法结构，而且要掌握每个字词的意义和用法，必要时还需要把文章翻译成中文。 对只需要查阅英语科技文献和信息的科技工作者，在多数情况下不需要使用精读技能。 What kind of materials are used in the experiment in this paper? And what properties or parameters of these materials are studied or discussed in this paper? What kind of equipments are used in the experiment in this paper? And what are they used for? What are studied in this experiment? What are analyzed or discussed in this paper? What results are got for each study in this paper? 2.Extensive Reading 泛读，通过阅读大量英语文章，来提高英语语感和扩大知识面。 泛读关键在于量，每周阅读二至三篇文章。 英语文章长度可长可短，因人而异。采用逐次增加长度的方法进行。 研究生选择与自己研究方向相同的论文阅读。 泛读练习时，必须要从头到尾把文章读完，对文章的关键词语和句子要有所理解。 最好根据文章的内容或特点，事先提出一些问题。 What is main theme of the article? What is the topic sentence of each paragraph? Pick up the sentences you are most interested in and analyze them. List the important and useful words and phrases. 3.Skimming Reading 略读是一种快速阅读技巧。对科技工作者，在查询大量英语文献时非常有用。 略读是快速阅读文章，目的是了解文章主题思想。 略读时不需要逐字去读，而是寻找文章内关键词语、主题句，从而了解文章的主题思想。在这个基础上，决定是否选取此资料，是否需要进一步精读。 Questions for skimming reading: What is the research field of this paper? What are the objectives of this paper? What problems are there in this field? What specific problems are studied in this paper? 4.Scanning Reading

	掠读也是一种快速阅读技巧，与略读不同的是，它用来查询文章中的特定信息。如： 看飞机时刻表，查找特定的航班时间； 查字典时，查阅所需要的词汇； 看文章时，查找特定的信息； 看报纸广告时，查找所需要的广告信息等等。 5.Science Paper Reading Skill 浏览和审视／细看 从图、表和数据获取信息 熟悉上下文中的同义词 从前缀、后缀和词属推断生词的意思 准确理解复合词／词组的含义 使用简单图形综合全文 **Common Mistakes** 1. 不完整的句子 (1) 单独孤立的一个从句，常以after, although, because, before, if, since, when或while等连词开头。 E.g. Although the problem is complicated. We can solve the problem in only two hours. Although the problem is complicated, We can solve the problem in only two hours. (2) 把属于同一主语的两个并列动词谓语分割开。 E.g. Researchers have doubled the previous efficiency of producing hydrogen from water. And have made major advances in carbon nanotube storage technology. Researchers have doubled the previous efficiency of producing hydrogen from water and have made major advances in carbon nanotube storage technology. (3) 不定式短语、介词短语、动名词短语的孤立使用。 E.g. To encourage the use of renewable energy electricity in the United States. Policy measures will be needed. To encourage the use of renewable energy electricity in the United States, policy measures will be needed. 2.散漫的句子 and, or 连接的并列句太多，定语从句中有定语从句等。 E.g. A communication network can be modeled as a graph, and a net work under attack or with sources of failure can be modeled as a random graph, regarding which, for the purpose of clarification, a graph, in the sense used here, consist of vertices and edges, of which each vertex corresponds to a command center or other node in a communication network and each

	edge represents a two-way communication link between two command centers – in a random graph, an edge may fail, leaving intact the vertices connected by the edge, or a vertex may fail, destroying all the edges connected to the vertex. 3.缺少连接词 句子从表面上要表达一个完整的观点，但实际上表达了不止一个的观点，使读者疑惑。 E.g. Assume that the wick thickness is small compared to the vapor space dimensions, D and A1/A2 are well represented by the E. 8 and E. 9. 修改方法： 把逗号改成句号或分号。 在逗号后加连接词and, but, for, or, nor, so, yet. 把独立分句改成从句或短句。 4.主谓不一致 主谓一致原则： 语法一致 意义一致 就近原则 (1)单数谓语: every, each, no another, either, neither as well as, together with, along with, in addition to E.g. Every paper, proposal, and report is stored in my computer. Neither of the two generators is imported. (2) “分数或百分数” + of + 名词或代词，根据of后的词决定谓语动词单复数形式。 E.g. Two-thirds of the people present are against the plan. Half of the trouble is the fault of the drafting department. (3) 表示总和、比率、测量和数量的词语做主语时，谓语动词单数。 E.g. Last year about forty hours was spent on that export. About eight pounds of carbon is added to the mix. 5. 时态的误用 (1) 用现在完成时叙述过去的事件。 E.g. At the ASHRAE Annual Meeting in Denver, Colorado, Mr. Smith has delivered the address. At the ASHRAE Annual Meeting in Denver, Colorado, Mr. Smith delivered the address. (2) 把现在完成时和过去完成时混淆。 E.g. They began their experiment after they had read the instruction. The reactor had worked twenty hours by ten o’clock yesterday evening.

	(3) 静态动词(状态动词)误用为动态动词。 E.g. Considerable uncertainty is existing about climate change responses to greenhouse gas emissions. Considerable uncertainty exists about climate change responses to greenhouse gas emissions. 状态动词： Appear, afford, be, believe, concern, consist of, constitute, contain, correspond, exist, feel, forget, know, suppose, involve, mean, mind, need, own, posses, remember, represent, result in, satisfy, seem, smell, understand, yield
作　业	查找给定方向的相关文献，并翻译摘要
主要 参考资料	网络资源
课后自我总结分析	对自己上过的课进行回顾与评价，仔细分析自己上课的得失成败，分析自己的教学是否适合学生的实际水平，是否能有效地促进学生的发展，在哪些方面有待改进，再寻求解决问题的对策，优化教学方法和手段，丰富自己的教学经验。

《高等数学》教学大纲

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同济大学数学系 编

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前　言

高等数学是高等院校大部分专业的一门重要基础理论课，是深入学习专业课程的必备基础. 培养学生的科学精神和科学素养。　随着数学在各学科中的应用日益广泛，无论从事科研工作还是教学工作，都应该具备良好的数学基础和灵活应用数学的能力.

学习方法：

1．注重理解，在理解的基础上熟记基本概念、基本公式、基本定理。

2．通过典型例题加深对概念、性质、定理的理解。

3．必须熟记基本初等函数的导数公式及基本积分公式。

4．强调基本概念的理解，而不注重概念的抽象性；

5．强调基本理论的实际应用，而不强调理论的证明技巧；

6．强调基本计算方法的运用，而不追求运算的技巧。

第一章　函数与极限

[教学目的和要求]

一、函数

1．理解邻域及空心邻域的概念及表示方法。

2．理解函数的概念，会求函数的定义域，值域，能判定两个函数是否相同。

3．掌握函数的三种表示法。

4．理解分段函数的定义。

5．掌握函数的基本性质：奇偶性，周期性，单调性，有界性。

6．会用奇偶性的定义判定函数的奇偶性，会用单调性定义判定函数的单调性。

7．了解反函数的定义，会求某些函数的反函数。

8．理解复合函数的概念，会把复合函数分解为简单函数。

9．掌握基本初等函数的定义，掌握六种基本初等函数的表达式，基本性质，图

形，定义域，值域。

10．掌握初等函数的定义。

二、极限

1．理解数列极限的定义。

2．掌握数列极限四则运算法则和基本性质，会求数列极限。

3．理解函数极限定义，会求函数极限。掌握左极限和右极限的定义，极限与左右极限的关系，会判定分段函数在分段点极限存在与否。

4．掌握函数极限的基本性质及四则运算法则。

5．掌握无穷大与无穷小的定义与关系。

6．掌握无穷小的性质。

7．掌握无穷小量阶的比较。

8．理解极限存在的两个准则。

9．熟记两个重要极限，能运用它们来计算相关极限。

10．掌握连续的概念及连续的表示方法。

11．能判定函数在某一点是否连续。

12．理解左右连续的定义，能判定分段函数在分段点是否连续。

13．理解函数在开区间及闭区间上连续的定义。

14．掌握连续函数的性质。

15．掌握间断点的定义，会求函数间断点。

16．理解闭区间上连续函数的基本性质。

[教学基本内容]

一、函数

1　实数与数轴

实数分为有理数和无理数

全体实数和数轴上的全体点一一对应。

2　实数的绝对值及其基本性质

｜x｜的定义和几何意义

3　区间与邻域

（1）、区间

有限区间：⑴开区间，⑵闭区间，⑶半开半闭区间，

无限区间：⑷ 右端无限⑸ 左端无限⑹ 两端无限

全体实数集合：（－∞，＋∞）＝｛x｜－∞＜x＜＋∞｝

区间的长。

（2）、邻域

邻域，邻域的中心，邻域的半径。空心邻域。

4　函数及其表示方法

（1）、函数定义

常量，变量，函数的定义，定义域，值域

定义域和对应规则是确定函数关系的两个要素。

（2）、函数表示法

函数的表示法有三种：列表法，图形法和公式法（解析法）。分段函数

5　函数的基本性质

函数的基本性质有：奇偶性，周期性，单调性，有界性。

6　反函数、复合函数

（1）、反函数

在同一坐标系中，y＝f(x)与 y＝f^{-1}(x)的图像关于直线 y＝x 对称

（2）、复合函数

7　初等函数

（1）、基本初等函数：常数函数，幂函数，指数函数，对数函数，三角函数和反三角函数

（2）初等函数

由基本初等函数经过有限次的四则运算和复合所得到的函数称为初等函数。

二、极限

1　数列的极限

数列定义。数列收敛发散的定义。数列极限四则运算法则

数列极限的基本性质：1．唯一性 2．有界性 3．常数列的极限是它本身。

2　函数极限

x→∞时，函数 f (x)的极限；x→x_0时， f (x)的极限

左右极限定义。函数 f (x)在点 x_0 处极限存在充分必要条件是在该点的左右极限都存在，并且相等。函数极限的性质：1．唯一性 2．有界性 3．局部保号性.。极限

四则运算法则

3　无穷大量与无穷小量

无穷大量，无穷小量定义，无穷大量与无穷小量的关系，无穷小量的性质，无穷小量的阶（高阶，低阶，同阶，等价）

4　两个重要极限

（1）、极限存在的准则（夹挤法，单调有界原理）

（2）、两个重要极限

$$\lim_{x\to 0}\frac{\sin x}{x}=1 \qquad \lim_{n\to\infty}(1+\frac{1}{n})^{n}=e \quad 或 \quad \lim_{x\to 0}(1+x)^{\frac{1}{x}}=e$$

§2.5　连续函数

增量定义，连续的概念，函数在一点处连续的三层含义，左右连续定义，连续函数的性质，间断点定义和类型。

§2.6　闭区间上连续函数的基本性质

有界性　　最大值、最小值定理　　介值定理　　根的存在性

第二章　导数与微分

[教学目的和要求]

1．掌握导数定义及表示方法，会用导数定义求导数。

2．了解导数的几何意义。

3．理解导函数定义及表示方法。

4．掌握左右导数的定义及函数在闭区间上可导的定义，会判定分段函数在分段点是否可导。

5．掌握可导与连续的关系。

6．熟记基本初等函数的导数公式及导数四则运算法则。

7．掌握复合函数的求导方法。

8．掌握隐函数求导方法及对数求导法。

9．理解高阶导数的定义，会求高阶导数。

10．掌握微分的定义及表示方法，微分与导数的关系。

11．掌握基本初等函数的微分公式及微分的四则运算法则，会求微分。

12．了解一阶微分的形式不变性。

[教学基本内容]

1　引入导数概念的例题（了解）

一、由平均速度求瞬时速度　　二、由割线斜率求切线斜率

2　导数的概念

导数定义，用导数定义求导数，导数的几何意义，物理意义，左右导数，可导与连续的关系

3　基本初等函数的导数公式

导数的四则运算法则

4　复合函数、反函数、隐函数的导数

一、复合函数的导数：复合函数对自变量的导数等于复合函数对中间变量的导数再乘以中间变量对自变量的导数。若 y＝ f [φ(x)] ,其中 u=φ(x)，则 ＝ ·

二、反函数的导数（了解）

若 y＝ (x) 的反函数是 x＝ 则 ＝

三、隐函数的导数

四、取对数求导法

（一）基本初等函数的导数公式（熟记）

1. ＝0

2. ＝α

3. ＝ (a＞0，a≠1) ＝

4. ＝ (a＞0，a≠1) ＝

5. ＝cosx

6. ＝－sinx

7. ＝

8. ＝－

9. ＝

10. ＝－

11. ＝ （－1＜x＜1）

12. ＝－ （－1＜x＜1）

13. ＝

14.　　＝－

（二）求导法则（熟记）

1.　　＝　±

2.　　＝　＋　　＝C

3.　　＝　　（v≠0）　　＝　　（v≠0）

4.　　＝　　其中 y＝ (u)　u＝

5.　　＝　　(　　≠0)（了解）

5　高阶导数

＝ ，　　＝sin（x＋n　），　　＝cos（x＋n　）

6 微分

一、　微分的定义，（由导数基本公式可求出微分基本公式）

微分基本公式（熟记）

1. dC＝0

2. d( )＝α　　dx

3. d(　　)＝　　dx　　（a＞0，a≠1）

4. d(lnx) ＝ dx

5. d( ) ＝ lnadx　　（a＞0，a≠1）

6. d( ) ＝ dx

7. d(sinx) ＝cosxdx

8. d(cosx) ＝－sinxdx

9. d(tgx) ＝　　＝　　dx

10. d(ctgx) ＝－　　＝－　　dx

11. d(secx) ＝secx·tgxdx

12. d(cscx) ＝－cscx·ctgxdx

13. d(arcsinx) ＝　　(－1＜x＜1)

14．d(arccosx) ＝－　　(－1＜x＜1)

15．d(arctgx) ＝　　dx

16．d(arcctgx) ＝－　　dx

二、微分的运算法则

1．d(u±v)＝du±dv

2．d(uv) ＝udv＋vdu

3．d(Cv) ＝Cdv

4．d( )＝　　(v≠0)

5．d( )＝－　dv

三．一阶微分的形式不变性

第三章　微分中值定理与导数应用

[教学目的和要求]

1．掌握罗尔定理，拉格朗日定理的内容及几何意义，

了解柯西定理，掌握三个定理之间的关系。

2．掌握拉格朗日定理的两个推论。

3．会验证某函数是否满足某中值定理。

4．能熟练应用罗必达法则求函数极限。

5．能熟练应用导数判定函数单调性。

6．掌握极值的定义，能熟练应用导数求函数的极值。

7．会求函数的最大最小值。

8．掌握曲线凸凹性及拐点的定义，能熟练应用导数来判定凸凹性及拐点。

9．会求曲线的渐近线。

10．了解函数作图。

[教学基本内容]

1　中值定理

罗尔定理，罗尔定理的几何意义；拉格朗日定理，拉格朗日定理的几何意义，推论 1，推论 2，柯西中值定理

2　未定式的定值法

一、　型未定式（罗必达法则Ⅰ）

二、　型未定式（罗必达法则Ⅱ）

0·∞型，∞—∞型 未定式可化为　型或　型

0°，　，∞°型未定式可先取对数

3　函数的单调性

4　函数的极值

一、函数的极植　极大值（或极小值）

二、极值的判定与求法

驻点，极值存在的必要条件，极值存在的充分条件Ⅰ，极值存在的充分条件Ⅱ

三、函数的最大值和最小值

5　曲线的凸凹性、拐点和渐近线

曲线的凸凹性及拐点，曲线的渐近线 1．水平渐近线 2．垂直渐近线 3．斜渐近线

6　函数作图

第四章　不定积分

[教学目的和要求]

1．掌握原函数及不定积分的定义，不定积分的表示方法。

2．了解不定积分的几何意义。

3．掌握不定积分的基本性质。

4．熟记基本积分公式。

5．能准确计算不定积分

[教学基本内容]

1　原函数与不定积分

原函数定义，不定积分定义，不定积分的几何意义

2　不定积分的性质

一、基本积分公式（熟记）

1．　　＝C　（C 为常数）

2．　　＝x＋C

3.　　＝　　（a≠－1）

4.　　＝　　（a＞0，a≠1）

5.　　＝

6.　　＝

7.　　＝

8.　　＝－

9.　　＝

10.　　＝　　＝－

11.　　＝

12.　　＝ln ＋C

4　不定积分的计算

直接积分法，换元积分法：第一类换元法（凑微分法），第二类换元法

5　分部积分法

第五章　定积分　　第六章　定积分的应用

[教学目的和要求]

1．掌握定积分的定义及表示方法，了解定积分的几何意义。

2．掌握定积分的基本性质。

3．会求函数在区间上的平均值。

4．掌握定积分与不定积分的关系。

5．掌握原函数存在定理。

6．会求变限积分的导数。

7．能应用换元法，分部积分法等方法准确计算定积分。

8．会利用定积分求平面图形的面积和了解旋转体体积的计算。

9．了解广义积分的定义和广义积分的敛散性的判定。

10．了解Γ函数的定义，基本性质及简单计算。

[教学基本内容]

1　定积分的概念

一、引出定积分概念的例题

1．求曲边梯形的面积

2．求变速直线运动的距离

二、定积分的定义，定积分的几何意义

2　定积分的基本性质

3　定积分与不定积分的关系

原函数存在定理

4　定积分的计算

一、定积分的换元积分法

二、定积分的分部积分法

5　定积分的应用

一、求平面图形的面积

二、求立体的体积

1．已知平行截面面积求体积（了解）

2．旋转体的体积

$V_x = \pi$　　，　$V_y = \pi$

6　广义积分与Γ函数

广义积分定义，收敛，发散定义 1．无限区间上的广义积分 2.无界函数的广义积分，Γ函数定义，性质

作业：

习题 1－1（21 页）

4.（2）、（3）、（5）　12.（1）、（2）

习题 1－3（37 页）

3.

习题 1－5（49 页）

1.（3）、（4）、（7）、（8）

习题 1－6（56 页）

1.（1）、（2）　2.（1）、（3）

习题 1－8（65 页）

3.（1）

习题 1－9（69 页）

1.

习题 2－2（97 页）

2.（1）、（3）、（5）、（7）　8.（1）、（3）

习题 2－5（123 页）

3.（1）、（2）

习题 3－2（138 页）

1.（1）、（2）、（3）

习题 3－5（162 页）

1.（1）

习题 4－2（207 页）

2.（1）、（2）、（3）

习题 4－3（212 页）

1.　2.

习题 5－2（243 页）

6.（1）、（2）、（3）、（4）

习题 6－2（284 页）

2.（1）、（2）

《工程制图》课程学习指导书

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第一章 国家制图标准与制图基本知识

教学重点：

1、掌握国家制图标准的基本规定，重点掌握图纸幅面的类型及图框尺寸大小；

2、掌握标题栏及会签栏的内容及作用；

3、掌握图线的种类和用途，了解工程图样上的工程字体及数字字母的书写要求；

4、掌握比例的含义，掌握工程图样常用的比例；

5、掌握尺寸标注的四要素，能够正确对简单形体进行的尺寸标注。

教学要求：自行购买三角板、绘图铅笔（2B、HB、2H 各一支）、橡皮擦（绘图用）作图工具，用于作习题集上的练习。2B 铅笔用于加深粗线型，HB 用于书写汉字及数字以及加深中、细线，2H 可用于画草图和打底线用。

作业：

1、绘制教材 P4 工程常用六种材料图例正确画法。（注意：图例中的斜线均为 45 度方向的细实线）

第二章 投影的基本知识

教学主要内容：

第一节　投影的形成及分类

第二节 平行投影的几何性质

第三节　三面正投影图的形成及其投影规律

第四节　工程上常用的四种投影图

教学重点及要求;

1、掌握投影的形成，光源（投射中心）、物体和投影面称为投影的“三要素”；

2、掌握投影的分类，投影可以分为中心投影和平行投影两种，其中，平行投影有可

以分为正投影和斜投影；

3、掌握平行投影的几何性质，平行投影的几何性质有同素性、从属性、定比性、平行性、显示性、积聚性；

4、重点掌握三面投影的形成及投影规律，H 面（水平面）、V 面（正投影面）、W 面（侧投影面）共同组成了一个三面投影体系，将形体放置于三面投影体系中，利用正投影法将形体分别向这三个投影面上进行投影，并将三面投影图展开，所形成的投影图就称为三面投影图；

5、掌握三面投影图的投影规律，“长对正，高平齐，宽相等”；

6、了解工程常用的投影图，正投影图、轴侧投影图、透视投影图、标高投影图，其中正投影图作图简便，便于度量，工程上应用最广，也是本教材的研究重点。

作业：

1、P9、P10。

第三章 立体表面元素的投影

教学主要内容：

第一节　点的投影

第二节　直线的投影

第三节　平面的投影

第四节　直线与平面及两平面的相对位置关系

教学重点及要求：

1、掌握点的投影规律，点的三面投影特性，点的作图步骤及方法；

2、掌握两点的相对位置关系及重影点，能正确判断两点的前后、上下、左右相对位置关系，掌握重影点的表示方法和投影特性；

3、掌握直线的分类及投影规律，掌握投影面平行线的分类及投影特性，掌握投影面垂直线的分类及投影特性，掌握一般位置直线的投影特性；

4、了解利用直角三角形法求一般位置直线的实长和倾角的方法；

5、掌握两直线的相对位置特性，能够正确判断两直线的平行、相交及交错关系。

6、掌握平面的分类及投影规律，掌握投影面平行面的分类及投影特性，掌握投影面垂直面的分类及投影特性，掌握一般位置平面的投影特性；

7、了解直线与平面及两平面的相对位置关系。

作业：

1、P11、P12、P13、P14、P15、P16、P17；

2、P20、P25、P26、P28；

3、P30

第四章 立体的投影

教学主要内容：

第一节　基本形体的投影

第二节　平面与立体相交求截交线

第三节　两立体相交求相贯线

第四节　组合体的三面投影

教学重点及要求：

1、掌握基本形体的三面投影特点及作图方法；

2、掌握平面与平面立体相交的截交线，掌握平面立体截交线的绘制方法；

3、掌握同坡屋面的概念、投影特性及作图方法；

4、掌握平面与曲面立体相交的截交线，掌握曲面立体截交线的绘制方法；

5、了解两立体相交求相贯线的方法。

6、掌握组合体的三面投影的投影特性，掌握组合体投影图的尺寸标注；

7、掌握组合体投影图的阅读基本方法，掌握形体分析法和线面分析法，根据组合体的投影图能够想象形体的空间，同时也能够根据形体的空间形状正确绘制出形体的三面投影图，并能够规范正确地进行尺寸标注。

作业：

1、P41、P42、P46、P48、P49；

2、P56、P57、P58、P59、P60；

3、P62、P63、P64、P65。

第五章 轴测图

教学主要内容：

第一节　轴测投影的基本知识

第二节　正等轴测图

第三节　斜轴测图

教学重点及要求：

1、掌握轴测投影概念及形成，掌握轴测投影面、投射方法、轴测投影轴、轴向伸缩系数、轴间角的基本概念；

2、掌握轴测投影的特性，轴测投影的平行线、度量性和变形性；

3、掌握正等轴测图的作图方法；

4、掌握斜轴测图的作图方法。

作业：

1、P66、P69 （1）

2、P 70（1）、P72（1）。

第六章 建筑形体的表达方式

教学主要内容：

第一节　各种建筑形体视图

第二节　剖面图

第三节　断面图

第四节　投影图的简化画法

教学重点及要求：

1、掌握形体的六面视图的名称及投射方向；

2、掌握剖面图的形成，剖面图的标注及剖切符号的含义，掌握剖面图的种类及绘图方法；

3、掌握断面图的形成，断面图的正确标注，掌握断面图的种类及绘图方法；

4、了解投影图的简化画法。

5、掌握工程常用的材料图例画法。

作业：

1、P74、P75（2）、P81、P82。

第七章 建筑施工图

教学主要内容：

第一节　建筑施工图概述

第二节　施工图首页

第三节 总平面图

第四节　建筑平面图

第五节　建筑立面图

第六节　建筑剖面图

第七节　建筑详图

教学重点及要求：

1、掌握一套完整的施工图一般应包括的主要内容，掌握房屋的组成、主要组成部分及构配件的名称作用；

2、掌握比例的概念，了解工程常用的绘图比例，掌握建筑施工图上的常用图线；

3、掌握定位轴线与编号，掌握附加定位轴线与编号；

4、掌握索引符号的含义及绘制，掌握详图符号的含义及绘制；

5、掌握标高的概念及分类，掌握标高符号的画法；

6、掌握指北针与风向频率玫瑰图的概念；

7、掌握常用建筑构配件的图例；

8、掌握建筑模数的概念；

9、掌握建筑总平面图的概念、作用及图示主要内容，了解总平面图常用图例；

10、掌握建筑平面图的形成、分类、作用及图示主要内容，掌握绘制方法与识读；

11、掌握建筑立面图的形成、分类、作用及图示主要内容，掌握绘制方法与识读；

12、掌握建筑剖面图的形成、分类、作用及图示主要内容，掌握绘制方法与识读；

13、掌握建筑详图的形成、作用及图示主要内容，掌握绘制方法与识读；

14、掌握识读建筑施工图的方法，通过学习，能够正确阅读中小型工程的建筑施工图纸。

作业：

1、P83、P84、P85、P86、P87；

2、识读 P88、P89、P90、P91。