

《综合设计》教学大纲

一、基本信息

课程名称：综合设计
课程代码：160306P005
总学时：3 周
实验学时：
开课学院：工学院
课程性质：必修

英文课程名称：Integrated Design
总学分：3
课内学时：3 周
上机学时：
适用专业：过程装备与控制工程
先修课程：所有理论和实验课程

二、课程简介

综合设计是过程装备与控制工程专业的一门综合实践课,其任务是使学生在学习了所有专业课程的基本理论和基本知识后,培养学生的综合设计能力和解决实际问题能力,是学生从事本专业的科研、生产工作所必备的实训环节。

本课程的教学内容主要包括立式、卧式储罐、吊柱、人孔等设备的强度计算、稳定性校核、结构设计,压缩机的热力计算和动力计算,以及上述设备的典型控制方案设计,并绘制装配图、零件图及机械加工工艺过程卡片等。

三、教学目标

通过综合设计环节的训练,培养学生综合运用本专业基本理论和基本知识的能力,提高学生独立分析问题、解决问题的能力,树立正确的设计思想,掌握过程单元设备设计的基本方法和步骤,为今后从事本专业的科研和生产工作打下坚实基础。具体包括:

- (1) 巩固和强化先修理论课程的基本理论和基本知识,包括过程设备设计、过程流体机械、过程装备控制技术及应用三大专业核心课程。
- (2) 树立正确的设计思想,熟悉、查阅并综合运用各种有关的设计手册、规范、标准、图册等设计技术资料。
- (3) 掌握本专业相关的识图、制图、运算、编写设计说明书等基本技能,完成作为工程技术人员在机械设计方面所必备的设计能力的基本训练。
- (4) 掌握过程单元设备设计的基本方法和步骤,掌握化工过程典型设备的结构设计和强度计算方法。

四、教学内容与学习要求

学生学完本课程后,完成一种典型设备的机械设计和自动控制方案设计,完成手绘 A3 设备总装图 1 张,零部件图 1 张,设计计算书 1 份,或者一套控制方案系统。具体教学内容、进度安排及学时分配如下表。

教学内容	学时	进度安排
1. 授课及准备阶段 讲述设备设计的主要内容和制图方法，并将标准图纸、设计参数等相关资料等发给学生，并督促学生去准备相应的资料	0.2 周	第 1 天
2. 编写计算说明书 根据设计任务书提供的设备工艺条件，进行设计计算和结构设计。	0.8 周	第 2-5 天
3. 手绘装配图	1 周	第 6-10 天
4. 手绘零件图	0.6 周	第 11-13 天
5. 课程设计答辩及修改	0.4 周	第 14-15 天

五、考核方式

是否排考	否
考核形式	报告
成绩评定方式	百分制
过程成绩/%	10
实验成绩/%	30
结课考试成绩/%	60

六、教材与参考书

（一）教材

《过程设备设计》，第四版，郑津洋，化学工业出版社，2015，ISBN：9787122249326。

（二）参考书目或文献

《化工设备机械基础课程设计指导书》，第二版，蔡纪宁，化学工业出版社，ISBN：9787122090133

《压力容器工程师设计指南》，第一版，戚国胜，中国石化出版社，2013，ISBN：9787511421913

GB150-1998《钢制压力容器》。

GB150-1998《钢制管壳式换热器》。

制定人：（课程负责人）马仲麟

审核人：（开课系主任）赵旭亮

制（修）订时间：2023 年 9 月

《Integrated Design》 Syllabus

I. Basic Information

Course Name: Integrated Design	Name in Chinese: 综合设计
Course No.: 160306P005	Total Credits: 3
Total Hours: 3 weeks	Lecture Hours: 3 weeks
Lab Hours:	Computer Lab Hours:
Offering College: College of Engineering	Corresponding Majors: Process equipment and control engineering
Course Type: Required	Prerequisite: All theoretical and experimental courses

II. Course Introduction

Integrated design is a comprehensive course of process equipment and control engineering, its task is to enable students to learn the basic theory of all professional courses and basic knowledge, develop students' comprehensive design ability and ability to solve practical problems, students engaged in the professional scientific research, production work necessary training links.

The teaching content of this course includes the strength calculation, stability check, structural design, compressor thermal calculation and power calculation of distillation tower, heat exchanger, storage tank and so on, and the typical control scheme design of the above equipment, and Draw assembly and part drawings.

III. Course Objective

Through the training of integrated design, the students' comprehensive ability of applying the basic theory and basic knowledge of the specialty can be cultivated to improve the students' ability of independent analysis and problem solving, set up correct design idea, master basic methods and steps of process unit equipment design, For the future in the professional research and production work to lay a solid foundation. These include:

- 1) Consolidate and strengthen the basic theory and basic knowledge of advanced theory course, including three core courses of process equipment design, process fluid machinery, process equipment control technology and application.
- 2) Establish the correct design ideas, familiar with, access and comprehensive use of the various design manuals, norms, standards, Atlas and other design technical information.
- 3) Master the relevant professional knowledge map, drawing, calculation, the preparation of design manuals and other basic skills to complete the engineering and technical personnel in the mechanical design of the necessary design skills, the basic training.
- 4) Master the process unit design of the basic methods and procedures to master the chemical process of structural design of typical equipment and strength calculation method.

IV. Contents and Requirements

After completing this course, students complete a mechanical design and automatic control design of a typical equipment, complete the equipment assembly drawing 1, parts 1, design calculation 1. Specific teaching content, schedule and time allocation as follows.

Teaching Content	Hours	Schedule
1. Preparation stage Prepare the design materials (manual, book, calculation and drawing tools).	0.2 week	Day1
2. Mechanical design stage According to the design process of equipment provided by the technical conditions, design calculations and structural design.	0.8 week	Day 2-5
3. Draw the assembly drawings	1 week	Day 6-10
4. Draw the parts and assembly drawings	0.6 week	Day 11-13
5. Course Design Reply Drawings and instructions are all completed, the qualified teachers after the review, to participate in the defense.	0.4 week	Day 14- 15

V. Evaluation

Whether or not to schedule the exam	No
Assessment format	Report
How grades are assessed	centesimal system
Process grades /%	10
Experimental results /%	30
End-of-course exam results /%	60

VI. Textbook and Reference

(1) Textbook

"Process Equipment Design", forth edition, Zheng Jinyang, Chemical Industry Press, 2015, ISBN: 9787122249326.

(2) Reference

"Chemical Equipment Machinery Foundation Course Design Guide," second editio, Cai Jining, Chemical Industry Press, 2011, ISBN: 9787122090133.

"Design Guide for Pressure Vessel Engineers", first edition, Qi Guosheng, Sinopec Press, 2013, ISBN: 9787511421913.

GB150-1998 "Steel Pressure Vessels".

GB150-1998 "Steel shell and tube heat exchanger."