

《科研训练》教学大纲

一、基本信息

二、课程简介

课程名称：科研训练
课程代码：160305P901
总学时：16
实验学时：0
开课学院：工学院
课程性质：必修

英文课程名称：Research training
总学分：1
理论学时：16
上机学时：0
适用专业：化学工程
先修课程：化工原理

科研训练是实施本科教育质量工程、提高人才培养质量的重要环节。科研训练的主要目标是让学生学会科研课题设计，并通过科研专题培训使学生了解相关研究领域存在的主要问题，并尝试解决问题。

三、教学目标

本课程是化工专业创新班本科生的一门基础课，目的主要是通过本课程的学习，使化工类专业的本科生具备一定的创新能力，有一定参与实验和实践的能力，以及分析问题和解决问题的能力，为今后独立开展科学研究工作奠定基础。要求学习本课程后，应达到以下基本要求：

- (1) 能够进行基本的化学与化工实验操作，能够对实验结果进行分析和处理。
- (2) 能根据问题自主设计实验。
- (3) 具备分析问题和解决问题的能力。
- (4) 具有较强的团队合作能力与表达能力，具有自主学习的能力。

四、教学内容与学习要求

(可按章节顺序或教学单元顺序编写，要详细说明具体教学内容、教学重点和难点，应清楚地表达知识、技能的范围和深度，充分反映课程的知识 and 技能要求，体现课程特点。)

章节/教学单元		教学内容、重点、难点	学时	学习要求
绪论		科研训练的课程安排、学习方法等。	1	<input checked="" type="checkbox"/> 理解
第一章 文献调研	1.1 中文常用数据库简介	知网、万方、维普等中文数据库的使用	1	<input checked="" type="checkbox"/> 记忆 <input checked="" type="checkbox"/> 理解 <input checked="" type="checkbox"/> 应用
	1.2 英文常用数据库简介	A C S，爱斯维尔，S p r i n g e r 等数据库的使用	1	<input checked="" type="checkbox"/> 记忆 <input checked="" type="checkbox"/> 理解 <input checked="" type="checkbox"/> 应用 <input checked="" type="checkbox"/> 综合分析
	1.3 科研论文的结构与撰写要求	介绍科研论文的结构与撰写要求	1	<input checked="" type="checkbox"/> 记忆 <input checked="" type="checkbox"/> 理解 <input checked="" type="checkbox"/> 应用 <input checked="" type="checkbox"/> 综合分析
第二章	第一节 实验选题与开题	根据化工专业导师设计的题目，选择不同的题目并进行开题报告撰写	1	<input checked="" type="checkbox"/> 记忆 <input checked="" type="checkbox"/> 理解 <input checked="" type="checkbox"/> 应用

章节/教学单元		教学内容、重点、难点	学时	学习要求
实验设计	第二节 实验进行	根据老师的要求和实验的安排进行实验	8	<input checked="" type="checkbox"/> 记忆 <input checked="" type="checkbox"/> 理解 <input checked="" type="checkbox"/> 应用
	第三节 实验结果总结与分析	对实验结果进行总结分析	1	<input checked="" type="checkbox"/> 记忆 <input checked="" type="checkbox"/> 理解 <input checked="" type="checkbox"/> 应用
第三章 论文撰写与PPT制作	第一节 论文撰写与投稿	根据得到的实验结果，进行论文的撰写。	1	<input checked="" type="checkbox"/> 理解 <input checked="" type="checkbox"/> 应用
	第二节 PPT制作	根据得到的实验结果，进行PPT制作并汇报	1	<input checked="" type="checkbox"/> 记忆 <input checked="" type="checkbox"/> 理解 <input checked="" type="checkbox"/> 应用

注：在“学习要求”一栏补充选项，可以多选，无要求可不填，也可自定要求。**记忆**，指能从记忆库中找到相关的知识、概念、术语或材料与当前的信息进行比较、确认，能记住并能不加理解的列出、描述这些知识、概念、术语或材料；**理解**，指能对所学的内容作归纳、分类、解释、总结、推断和一定程度的发挥；**应用**，指能选择正确的程序应用、实施所学到的内容，并能进行必要的计算或决断；**综合分析**，指能将所学的内容分解并找出它们的相互关系和构成，或能计划、创造、建造、有改变的重构，或能作评论、总结、估计、预测、评估、论证和答辩。

五、教学方法

本课程以“夯实基础、强化实验、培养能力”为教学理念，倡导基础理论与实验操作相结合。包括两个主要教学环节，即课堂理论教学和实验。

1. 课堂理论教学

教师讲授课程要求的基本概念和基本理论；同时，设计讨论性问题，引导学生思考，通过师生互动交流，得到合理的认识。在这一环节，学生以听课为主。

教学材料包括教材及教学PPT。

2. 实验

学生通过本课程可以巩固、扩大和加深课堂所学的理论知识，了解化学实验的特点，初步学会常用仪器的使用。

六、考核方式

是否排考	否
考核形式	科研论文+PPT汇报
成绩评定方式	百分制
PPT成绩/%	40%
实验成绩/%	0%
论文成绩/%	60%

七、教材与参考书

（一）教材

《大学生科研训练教程》，第2版，陈坤杰主编，合肥工业大学出版社，2010，ISBN: 9787810939867。

（二）参考书目或文献

1、《大学生科研训练与论文写作》，第2版，相艳主编，上海交通大学出版社，2018，ISBN: 9787313200464。

制定人：侯军伟

审核人：王志朴

制（修）订时间：2023年9月

《Research training》 Syllabus

I. Basic Information

Course Name: Research training

Name in Chinese: 科研训练

Course No.: 160305P901

Total Credits: 1

Total Hours: 16

Lecture Hours: 16

Lab Hours: 0

Computer Lab Hours: 0

Offering College: Department of Engineering

Corresponding Majors: Chemical Engineering

Course Type: Required

Prerequisite: The Principle of Chemical Engineering

II. Course Introduction

Research training is an important link to implement the undergraduate education quality project and improve the quality of talent training. The main goal of scientific research training is to let students learn the design of scientific research topics, and to make students understand the main problems in the relevant research field, and try to solve the problems.

III. Course Objective

Research training is a basic course of chemical professional innovation class undergraduates, the purpose is mainly through the study of this course, make the chemical professional undergraduates have certain innovation ability, the ability to participate in experiment and practice, and the ability to analyze and solve problems, lay a foundation for independent scientific research work in the future. After studying this course, the following basic requirements should be met:

- (1) Ability to carry out basic chemical and chemical experimental operations, ability to analyze and process the experimental results.
- (2) Ability to independently design experiments according to the problem.
- (3) The ability to analyze and solve problems.
- (4) Strong teamwork ability and expression ability, and have the ability of independent learning.

IV. Contents and Requirements

(It can be written in the order of chapters or teaching units. The specific teaching content, teaching key points and difficulties should be explained in detail. The scope and depth of knowledge and skills should be clearly expressed, fully reflect the knowledge and skill requirements of the course, and reflect the characteristics of the course.)

Chapter/Unit		Contents and Key Points	hrs	Requirements
Introduction		Curriculum arrangement and learning methods of scientific research and training, etc.	1	<input checked="" type="checkbox"/> Comprehension
Chapter 1 Literature research	1.1 Introduction to the Chinese common database	The use of Chinese databases such as CNKI, Wanfang, CQVIP and etc.	1	<input checked="" type="checkbox"/> Memory <input checked="" type="checkbox"/> Comprehension <input checked="" type="checkbox"/> Application
	1.2 English	Use of ACS, Elsevier, Springer	1	<input checked="" type="checkbox"/> Memory

Chapter/Unit		Contents and Key Points	hrs	Requirements
	common database brief introduction	and other databases.		<input checked="" type="checkbox"/> Comprehension <input checked="" type="checkbox"/> Application <input checked="" type="checkbox"/> Comprehensive Analysis
	1.3 Structure and writing requirements of scientific research papers	Introduce the structure and writing requirements of scientific research papers.	1	<input checked="" type="checkbox"/> Memory <input checked="" type="checkbox"/> Comprehension <input checked="" type="checkbox"/> Application <input checked="" type="checkbox"/> Comprehensive Analysis
Chapter 2 Design of experiments	2.1 Experimental topic selection and opening topic	According to the topics designed by the chemical industry professional tutor, choose different topics and write the opening report.	1	<input checked="" type="checkbox"/> Memory <input checked="" type="checkbox"/> Comprehension <input checked="" type="checkbox"/> Application
	2.2 The experiment carried out	Conduct the experiment according to the teacher's request and the arrangement of the experiment.	8	<input checked="" type="checkbox"/> Memory <input checked="" type="checkbox"/> Comprehension <input checked="" type="checkbox"/> Application
	2.3 Summary and analysis of the experimental results	Summary and analysis of the experimental results.	1	<input checked="" type="checkbox"/> Memory <input checked="" type="checkbox"/> Comprehension <input checked="" type="checkbox"/> Application
Chapter 3 Thesis writing and PPT production	3.1 Paper writing and submission	According to the experimental results, the thesis is written.	1	<input checked="" type="checkbox"/> Comprehension <input checked="" type="checkbox"/> Application
	3.2 Create a PPT	According to the obtained experimental results, the PPT was made and reported.	1	<input checked="" type="checkbox"/> Memory <input checked="" type="checkbox"/> Comprehension <input checked="" type="checkbox"/> Application

Note: in the "learning requirements" column of supplementary options, can choose more, no requirements can not fill, can also set requirements. memory, The ability to find relevant knowledge, concepts, terms or materials from memory banks for comparison, confirmation with current information, To list, describe such knowledge, concepts, terms, or materials that remember and understand; understand, Refers to the ability to summarize, classify, explain, summarize, infer and play to a certain extent; apply, Being able to choose the right program to apply, implement what is learned, And be able to make the necessary calculations or decisions; aggregate analysis, Refers to the ability to break down what you have learned and find out their interrelationship and composition, Or can plan, create, build, have changes to the reconstruction, Or can comment, summarize, estimate, forecast, evaluate, demonstrate and reply.

V. Teaching Method

This course takes the teaching concept of "consolidating the foundation, strengthening the experiment and cultivating the ability", and advocates the combination of basic theory and experimental operation. It includes two main teaching links, namely, classroom theory teaching and experiment.

1. Classroom theory teaching

Teachers teach the basic concepts and theories required by the course, and design discussion problems to guide students to think and get reasonable understanding through the interaction between teachers and students. In this link, the students mainly listen to the class.

Teaching materials include teaching materials and teaching PPT.

2. Experiment

Through this course, students can consolidate, expand and deepen the theoretical knowledge learned in the classroom, understand the characteristics of chemical experiments, and initially learn the use of common instruments.

VI. Evaluation

Whether to row an examination	NO
Assessment form	Research paper + PPT report
Performance evaluation method	Centesimal system
PPT mark /%	40%
Experimental results /%	0%
Paper score /%	60%

VII. Textbook and Reference

(1) Textbook

College Student Scientific Research Training Course, 2nd edition, edited by Chen Kunjie, Hefei University of Technology Press, 2010, ISBN: 9787810939867.

(2) Reference

1. Scientific Research Training and Psay Writing, 2nd edition, Xiang Yan, Shanghai Jiao Tong University Press, 2018, ISBN: 9787313200464.

Made by: Hou Junwei

Reviewer: Wang Zhipu

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