广东以色列理工学院化学工程与工艺专业人才培养方案

（专业代码：081301H）

一、概述

化学工程与工艺教学宗旨是培养能够解决本地乃至世界范围内由人为和自然引起的能源、水、健康、食品以及塑料、聚合物、纸张等消费品制造等方面的环境问题的优秀科技人才。化学工程研究以化学工业为代表的，以及其他过程工业（如石油炼制工业、冶金工业、食品工业、印染工业等）生产过程中有关化学过程与物理过程的一般原理和规律，并应用这些规律来解决过程及装置的开发、设计、操作及优化问题的工程技术学科。化工学科的应用领域非常广泛，包括能源（石油天然气，发电厂、可再生能源、太阳能等）、水处理（脱盐、废水处理）、聚合物、微电子、纳米技术、制药与生物技术、石化产品、安全、环境质量等。

二、培养目标

本专业旨在培养能够应对未来 50 年全球性挑战的科学家和工程师等科技人才，使其契合国家经济与科技发展的需求，成为具备宽厚的理论基础知识，通晓化工生产技术的专业原理、专业技能与研究方法，能够从事过程工业领域的产品研制与开发、装置设计、生产过程的控制以及企业经营管理等方面工作的高素质科技人员和技术人才。优秀毕业生将有良好的学科基础进一步深造，在科研院所从事世界一流的科研活动，也能够成为一流的化工工程师，参与到从初始设计到完成产品的相关过程，可在能源、环境、材料、半导体制造、生物医药、食品等行业从事技术开发工作，也可以在工程设计部门或政府监管机构工作。

三、毕业学分要求

四年制本科专业的总学分为 158 分，含 2 个学分的体育课。学生还需要修满教育部规定的思想政治理论课程学分，并达到考核合格标准。教学包含理论教学及各类实践教学环节。

四、修业年限

四年，授予广东以色列理工学院化学工程专业工学学士学位，以色列理工学院 Chemical Engineering 学士学位。

五、人才培养基本要求

1. 具有本专业所需的数学、化学和物理学等自然科学知识以及一定的经济学和管理学知识，掌握化学、化学工程与技术学科及相关学科的基础知识、基本原理和相关的工程基础知识。
2. 具有运用本专业基本理论知识和工程基础知识解决复杂工程问题的能力，具有系统的工程实践学习经历，了解本专业的发展现状和化工新产品、新工艺、新技术、新设备的发展动态。
3. 掌握典型化工过程与单元设备的操作、设计、模拟及优化的基本方法。
4. 具有创新意识和对化工新产品、新工艺、新技术、新设备进行研究、开发与设计的基本能力。
5. 了解国家对化工生产、设计、研究与开发、环境保护等方面的方针、政策和法规，遵循责任关怀的主要原则；了解化工生产事故的预测、预防和紧急处理预案等，具有应对危机与突发事件的初步能力。
6. 具有一定的组织管理能力、表达能力和人际交往能力以及团队合作能力。
7. 对终身学习有正确认识，具有不断学习和适应发展的能力。
8. 具有一定的国际视野和优秀的外语水平以及跨文化交流、竞争与合作能力。

六、毕业要求

本专业学生在规定年限内完成教学计划要求，取得不少于规定的158学分（包括专业核心课程 122.5 学分，专业选修课程 25.5 学分以及通识选修课程 10 学分），并且每门课程达到 55 分以上，GPA 达 65 分以上，满足教育部规定的思想政治理论课的学分要求，可经审核准予毕业。

七、基本信息资源

通过手册、网站等形式，提供本专业的培养方案，各课程的教学大解、教学要求、考核要求，毕业审核要求等基本教学信息。

八、教材及参考书

选用反映国际水平的外文版教材，有利于稳妥地开展双语或全外语教学。

化学工程与工艺专业课程目录 [1]

专业必修课	122.5 分
专业选修课	25.5 分
通识选修课	10 分
总分	**158 分**

课程代码	课程名称 （专业核心课程）	学分
第一学期		
01040041	微积分 1M	5
01140051	物理学 1	2.5
01240120	基础化学	5
01340127	现代生物学	2
03240033	专业英语 2	3
	总学分	**17.5**
第二学期		
00540478	化学工程专业导论	3
01040043	微积分 2M	5
01040016	线性代数 1	5
01250801	有机化学	5
01250101	分析化学 1	1.5
03940800	体育	1
	总学分	**20.5**
第三学期		
01040131	常微分方程/H	2.5
01140052	物理学 2	3.5
01240213	分析化学 2	1.5
01250102	分析化学实验 1	2
02340128	科学计算导论（Python）	4
00540316	化工热力学 1	3.5
01340019	生物化学与酶化学导论	2.5
03940800	体育	1
	总学分	**20.5**
第四学期		
00540480	化工原理 1M	4.5
01240911	有机化学实验 1	3
01250000	量子化学（工科类）	4

1.开设课程与学期根据以色列理工学院教学计划与实际教学安排可能进行动态调整。

00540319	高级热力学 B	3
00540374	化工过程数值分析	3
01040228	偏微分方程/H	3
	总学分	**20.5**
第五学期		
00540320	高级热力学 B	5
00540309	分离操作	6
00540482	化学和生物化学反应器设计（H）	4
01240214	分析化学实验 2	2
00940481	概率论与数理统计导论	4
	总学分	**21**
第六学期		
00540310	化工实验 1	2.5
00540330	化工过程模拟实验	1
00540322	反应器设计原理	4
	总学分	**7.5**
第七学期		
00540479	过程动力学与控制	4
00540400	化工实验 2	2.5
00540417	化工过程设计	5
	总学分	**11.5**
第八学期		
00540410	工业设计	3.5
	总学分	**3.5**

具体思政课程要求如下表：

序号	**课程名称**	**学分**
1	马克思主义基本原理	3
2	毛泽东思想和中国特色社会主义理论体系概论	3
3	中国近现代史纲要	3
4	思想道德与法治	3
5	习近平新时代中国特色社会主义思想概论	3
6	形势与政策	2
7	走在前列的广东实践	1
8	大学生国家安全教育	1
	总分	**19**
9	中华民族共同体概论（选修）	2

GTIIT Cultivation Scheme of Chemical Engineering Program

1. Overview

The purpose of teaching in Chemical Engineering Program is to cultivate excellent scientific and technological talents that can solve the problems of energy, water resources, health, food and the manufacture of consumer goods such as plastics, polymers and paper, which are caused by man-made and natural causes, locally and worldwide. Chemical engineering research is represented by the chemical industry, as well as other process industries (e.g. petroleum refining industry, metallurgical industry, food industry, printing and dyeing industry, etc.) in the production process of chemical and physical processes of the general principles and laws, and the application of these laws to solve the process and device development, design, operation and optimization of the problem of engineering and technical disciplines. Chemical disciplines are used in a wide range of applications, including energy (oil and gas, power plants, renewable energy, solar energy, etc.), water treatment (desalination, wastewater treatment), polymers, microelectronics, nanotechnology, pharmaceutical and biotechnology, petrochemical products, safety, environmental quality, etc.

2. Cultivation Goal

This program aims to cultivate scientists, engineers, and technological talents capable of addressing global challenges over the next 50 years, aligning them with the needs of national economic and technological development. Graduates will possess a broad and solid foundation in theoretical knowledge, master the professional principles, specialized skills, and research methods of chemical production technology, and be capable of working as high-quality technical professionals and engineers in areas such as product development, equipment design, production process control, and enterprise management within the process industries. Outstanding graduates will have a strong disciplinary foundation to pursue further studies and engage in world-class scientific research at research institutions. They will also be equipped to become top-tier chemical engineers, participating in processes from initial design to final product realization. Career opportunities include technical development in industries such as energy, environment, materials, semiconductor manufacturing, biomedicine, and food, as well as roles in engineering design departments or government regulatory agencies.

3. Total Credits for Graduation

The total credits of the four-year undergraduate program are 158, including 2 credits of physical education courses. Students are also required to complete the credits in ideological and political

theory courses as stipulated by the Ministry of Education of China and meet the passing assessment standards. The teaching includes theoretical teaching as well as practical teaching.

4. Study Years

4 years, students will be awarded the bachelor degree in Chemical Engineering of GTIIT, and the bachelor degree in Chemical Engineering from the Technion.

5. Basic Requirements for Talents Cultivation

a. Master the knowledge of mathematics, chemistry, physics, and other natural sciences, as well as certain knowledge of economics and management; master basic knowledge and basic principles, as well as the related basic engineering knowledge of chemistry, chemical engineering, technical disciplines and other related disciplines.
b. Able to solve complicated engineering problems by applying the basic theoretical knowledge of the subject and the basic engineering knowledge; have systematic practices in engineering projects; and understand the development status of the subject, and the developments of new products, new crafts, new technologies, new equipment in the field of chemical engineering.
c. Master the basic methods of operation, design, simulation and optimization of typical chemical processes and unit equipment.
d. Have a sense of innovation, and have the basic abilities to do R&D and design of new products, new crafts, new technologies, new equipment in the field of chemical engineering.
e. Have the knowledge of the country's policies, regulations and laws on chemical engineering production, designing, R&D, as well as on environmental protection; follow the main principles of responsible care; have the knowledge of prediction, prevention, and emergency handling of chemical production accidents, and have the basic abilities to deal with crises and emergencies.
f. Able to organize and to manage; have good oral and written expressions, good interpersonal skills and team working ability.
g. Have a correct understanding of lifelong learning, and continue to learn and adapt to developments.
h. Have a global vision, high-level foreign language proficiency, intercultural communications ability and cooperation ability.

6. Graduation Requirements

Students will graduate when fulfilling the graduation requirements within the prescribed number of years, and have at least 158 credits of the described structure of core (122.5 credits),

program elective (25.5 credits) and general elective courses (10 credits), with a minimum grade of 55 in each course, and GPA above 65. Fulfilling the requirement of MOE ideological and political theory courses, students may be approved for graduation upon review.

7. Basic Information Resources

The program cultivation schemes, syllabi, teaching criteria, and assessment criteria of courses, graduation evaluation criteria and other basic teaching information are offered in form of brochures, websites, etc.

8. Textbooks and References

Foreign language textbooks that reflect the international level are selected for steady practices of bilingual or fully English-medium instruction.

Chemical Engineering Program Curriculum[2]

Compulsory Courses	122.5	points
Program Elective Courses	25.5	points
General Elective Courses	10	points
TOTAL	**158**	**points**

Course Code	Course Name (Program Core Course)	Credits
Semester 1		
01040041	Differential and Integral Calculus 1M	5
01140051	Physics 1	2.5
01240120	Fundamentals of Chemistry	5
01340127	Modern Biology	2
03240033	Technical English-Advanced B	3
	Total	**17.5**
Semester 2		
00540478	Int. to Chemical and Biochemical Eng.	3
01040043	Differential and Integral Calculus 2M	5
01040016	Algebra 1/Extended	5
01250801	Analytical Chemistry 1 for Engineers	5
01250101	Organic Chemistry	1.5
03940800	Physical Education Courses	1
	Total	**20.5**
Semester 3		
01040131	Ordinary Differential Equations/H	2.5
01140052	Physics 2	3.5
01240213	Analytical Chemistry 2 (Expanded)	1.5
01250102	Analytical Chemistry Lab.1 for Engineers	2
02340128	Introduction to Computing with Python	4
00540316	Thermodynamics A	3.5
01340019	Introduction to Biochemistry and Enzimol	2.5
03940800	Physical Education Courses	1
	Total	**20.5**
Semester 4		
00540480	Principles of Chemical Engineering 1M	4.5
01040228	Partial Differential Equations/H	3
01250000	Quantum Chemistry for Engineers	4
01240911	Organic Chemistry Lab 1	3

2. Course offerings and scheduling may be properly adjusted in accordance with the Technion's academic plan and actual teaching arrangements.

00540319	Thermodynamics B	3
00540374	Process Analysis Using Numerical Methods	3
	Total	**20.5**
Semester 5		
00540320	Principles of Chemical Engineering 2H	5
00540309	Separation Operations	6
00540482	Int. to Chem. and Biochem. Reactors' Design (H)	4
01240214	Analytical Chemistry 2 Lab. (Expanded)	2
00940481	Int. to Probability and Statistics	4
	Total	**21**
Semester 6		
00540310	Chemical Engineering Laboratory 1	2.5
00540330	Chemical Process Simulation Laboratory	1
00540322	Principles of Reactor Design (H)	4
	Total	**7.5**
Semester 7		
00540479	Int. to Process Dynamics and Control M	4
00540400	Chemical Engineering Laboratory 2	2.5
00540417	Integrated Chemical Process Design	5
	Total	**11.5**
Semester 8		
00540410	Plant Design M	3.5
	Total	**3.5**

The specific MOE courses are listed below:

No.	Course Name	Credit
1	Basic Principles of Marxism	3
2	Introduction to Mao Zedong Thought and the Theoretical System of Socialism with Chinese Characteristics	3
3	An Outline of Modern and Contemporary Chinese History	3
4	Ideological and Moral Cultivation and the Rule of Law	3
5	An Introduction to Xi Jinping’s Thought of Socialism with Chinese Characteristics in the New Era	3
6	Situation and Policy	2
7	Guangdong’s Pioneering Practices	1
8	National Security Education	1
	Total	**19**
9	Introduction to the Chinese National Community (Elective)	2