广东以色列理工学院机械工程[1]专业人才培养方案

（专业代码：080201H）

一、 概述

本专业具有学科基础扎实、应用范围广泛的特点。专业特色在于立足富有深度与广度的课程体系，融合高水平的机械工程学科的专业教育。优秀本科生可参与专业教授指导的研究项目。在修业年限内学成的学生将获颁以色列理工学院学士学位证书，以及广东以色列理工学院本科毕业证书、学士学位证书。

二、培养目标

本专业融合了“大机械”理念以实践教学为基石，鼓励学生跨专业跨学科学习，强调将自然科学、工程科学以及机械科学的专业系统相结合，将机械工程的知识运用到计算机化机械系统、海上与陆空运输载具、精密医疗器械、微电子芯片、自动化农业、机器人应用等多项领域。在广泛的学科交流学习中，专业期望培养出具有更高视野、更多维技能、更符合国家前沿科技需要的优秀工程师人才。

三、毕业学分要求

四年制本科专业的总学分为 157.5 学分，含 2 个学分的体育课。学生还需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。

四、修业年限

四年，授予广东以色列理工学院机械工程专业工学学士学位，以色列理工学院 Mechanical Engineering 学士学位与机器人方向学习证书。

五、人才培养基本要求

1. 使学生接受系统的机械工程思维训练，掌握机械工程专业的思想方法，具有较扎实的机械工程设计原理基础和较强的设计创新能力。

2. 具备机械工程研究或运用机械工程知识解决实际问题的初步能力。

3. 了解机械工程的历史概况和广泛应用，以及当今机械工程领域的新进展。

4. 掌握资料查询、文献检索以及运用现代技术获取相关信息的基本方法。

5. 熟练使用计算机，达到良好的计算机水平，了解机械工程学科的发展现状和趋势。

1.以色列理工学院对应专业名称为“Mechanical Engineering and Robotics，机械工程与机器人”。

6. 采用全英授课模式，使用英文原版教材，培养学生英语思维与逻辑能力，使学生具备在英语国家大学就读所需的同等语言水平。学生应当具有一定的国际视野和跨文化交流、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 157.5 学分（包括专业核心课程 115 学分，专业选修课程 32.5 学分以及通识课 10 学分），并且每门课程达到 55 分以上，GPA 达 65 分以上，满足国家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

以手册、网站等形式，提供本专业的培养方案，各课程的教学大纲、教学要求、考核要求、毕业审核标准等基本教学信息。

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英文教学。

机械工程专业课程目录 [2]

专业必修课	115 分
专业选修课	32.5 分
通识选修课	10 分
总分	**157.5 分**

课程代码	课程名称 （专业核心课程）	学分
第一学期		
104041	微积分 1M	5
104016	代数 1	5
114051	物理学 1	2.5
234128	科学计算导论（Python）	4
324033	专业英语 B	3
	总学分	**19.5**
第二学期		
104043	微积分 2M	5
104131	常微分方程/H	2.5
034028	固体力学 1	4
114081	物理实验 1H	1
125001	普通化学	3
314533	工程材料导论 1	3.5
394800	体育	1
	总学分	**20**
第三学期		
034053	固体力学 2	5
034061	技术制图和工程图	3.5
034056	科学与工程计算基础	4
034035	热力学 1	4
104228	偏微分方程 M	3
114052	物理学 2	3.5
035026	机械工程创新概论（选修）	2.5
125013	普通化学实验	0.5
	总学分	**23.5**
第四学期		
034030	制造工艺	3.5
034010	动力学	5
034055	流体流动学延伸	5
034032	线性系统	4

2.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。

394800	体育	1
	总学分	**18.5**
第五学期		
034041	传热学	4
034040	控制导论	3
034054	机械设计 1 M	4
034058	机械工程概率论与统计	3
034051	振动机理与动力学	3
	总学分	**17**
第六学期		
034057	机械工程高级实验	4
034371	设计制造项目	2.5
034060	机电一体化和电动机概论	4
	总学分	**10.5**
第七学期		
毕设项目：第一部分，选修以下课程之一		
034379	毕设：工程项目 1	3
034355	毕设：科学项目 1	3
034353	毕设：新产品设计 1，需与以下课程同修	3
034382	工程开发方法论 1	0.5
	总学分	**9.5**
第八学期		
毕设项目：第二部分，选修以下课程之一		
034380	毕设：工程项目 2	3
034381	毕设：科学项目 2	3
034354	毕设：新产品设计 2，需与以下课程同修	3
034383	工程开发方法论 2	0.5
	总学分	**9.5**

机械工程 专业选修课程列表		
分类：	A. 计算类课程； B. 核心科目课程； C. 应用与综合类课程； D. 通识科学课程； E. 系内通识选修课程	
课程代码	**课程名称**	**学分**
A. 计算类课程		
035022	工程分析中的有限元 R*	3.0
035013	机械工程中的计算方法	2.5
035199	计算流体动力学	3.0
036015	机械工程中的有限元方法 1*	3.0
035039	信号处理	3.0
* 036015 和 035022 中只能任选一门		
B. 核心科目课程		
035188	控制论 R	3.5
035001	机器人概论 R	2.5
036049	神经网络控制与诊断	2.5
035091	热力学 2	3.5
036009	传热传质学	3.0
035035	流体力学 2	2.5
036005	分析动力学	3.0
035003	计算机辅助设计系统	3.0
034016	机械工程设计 2	3.0
035123	制造系统概论 1	2.5
035043	弹性理论概论	3.0
035041	微系统力学	3.5
035034	材料失效	2.5
035050	光学系统设计	3.5
035052	线性光学及应用 1	3.5
035062	结构分析	2.5
C. 应用与综合类课程		
034401	先进机器人实验 R	2.5
035026	机械工程创新概论	2.5
035032	基于微处理器的产品设计	3.0
034404	先进计算机辅助设计实验	2.0
034406	先进控制与自动化实验	2.5
034410	先进能源实验	2.5
034411	内燃机实验	2.5

034413	设计与制造实验	2.0
034420	可再生能源先进实验	2.5
034422	光学实验	2.5
035048	综合设计与分析	2.5
035051	最佳化机械设计	4.0
036063	系统实验建模	3.0
034047	流体力学高级实验	2.0
036027	海洋结构动力学	3.0
D. 通识科学课程		
036001	分析方法 1	4.0
104215	复函数 A	2.5
E. 系内通识选修课程		
035008	工业自动化	2.5
035036	控制系统设计 R	2.5
035033	传感器集成系统概论 R	3.0
236327	数字图像和信号处理 R	3.0
035010	机构运动学 R	2.5
036026	机器人控制运动动力学 R	2.5
036087	混杂动力学	3.0
034205	气动及液动元件 1	3.0
035053	可再生和可持续能源	3.0
036038	界面传输过程	3.0
035146	内燃机概率论	2.5
086284	风力涡轮机	3.0
同时向本科生和研究生开放的研究生课程列表		
036009	传热传质学	3.0
036049	神经网络控制与诊断	2.5
036001	分析方法 1	4.0
036038	界面传输过程	3.0
036026	机器人控制运动动力学 R	2.5
036087	混杂动力学	3.0

*R 标为机器人相关课程

GTIIT Cultivation Scheme of Mechanical Engineering and Robotics Program

1. Program Positioning

The study program Mechanical Engineering has the characteristics of strong foundation of the relevant disciplines and wide application range. This program has a solid disciplinary foundation and a wide range of applications. The specialty is based on a curriculum system with depth and breadth, integrating high-level professional education in mechanical engineering. Excellent undergraduates can participate in research projects guided by professional professors. Students who complete their studies within the prescribed period will be awarded a bachelor's degree from the Technion, as well as a bachelor's degree and a graduation certificate from the Guangdong Technion-Israel Institute of Technology (GTIIT).

2. Cultivation Goal

This program integrates the concept of "big machinery" and takes practical teaching as the cornerstone. It encourages students to learn across majors and disciplines, emphasizes the combination of natural sciences, engineering sciences and mechanical sciences, and applies the knowledge of mechanical engineering to computerized mechanical systems, marine and land and air transportation vehicles, precision medical equipment, microelectronic chips, automated agriculture, robotic applications and other fields. In the extensive exchange of disciplines, the major hopes to cultivate outstanding engineers with higher vision, more multi-dimensional skills and more in line with the needs of the country's cutting-edge science and technology.

3. Total Credits for Graduation

The total credits of the 4-year undergraduate program are 157.5, 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 (MOE) and meet the passing assessment standards.

4. Study Years

4 years, students will be awarded the bachelor’s degree in Mechanical Engineering of GTIIT, the bachelor’s degree in Mechanical Engineering and the certificate of the track of Robotics in Mechanical Engineering from the Technion.

5. Basic Requirements for Talents Cultivation

a. Students will receive systematic training in mechanical engineering thinking, master the thinking methods of mechanical engineering, and have a solid foundation in mechanical engineering design principles and strong design innovation capabilities.
b. Students will have the preliminary ability to conduct mechanical engineering research or apply mechanical engineering knowledge to solve practical problems.
c. Students will be familiar with the historical overview of mechanical engineering and its wide applications, as well as the latest advancements in contemporary mechanical engineering.
d. Students will master the basic methods of information retrieval, literature search, and the use of modern technology to obtain relevant information.
e. Students will be proficient in the use of computers, achieving a good level of computer literacy, and be aware of the current state and trends in the development of mechanical engineering.
f. Adopt a full English teaching model, using English-language original textbooks to cultivate students' English thinking and logical abilities, ensuring they have the equivalent language level required for studying at universities in English-speaking countries. Students will have a certain international perspective and the ability to engage in cross-cultural communication, competition, and cooperation.

6. Graduation Requirements

Students must complete the required credits stipulated by the teaching plan within the prescribed years, obtaining no less than the specified 157.5 credits (including 115 credits for program core courses, 32.5 credits for elective courses, and 10 credits for general education). Additionally, each course must be passed with a minimum grade of 55, and the 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 scheme, syllabus, teaching requirements, assessment criteria, graduation evaluation standard, as well as other fundamental teaching information, are available in the form of brochures, websites, etc.

8. Textbooks and References

The selection of textbooks that reflect international standards, particularly those in foreign languages, is conducive to the stable implementation of bilingual or fully English-medium instruction.

Mechanical Engineering and Robotics Program Curriculum[3]

Compulsory Courses	115	points
Program Elective Courses	32.5	points
General Elective Courses	10	points
TOTAL	**157.5**	**points**

Course Code	Course Name (Program Core Course)	Credits
Semester 1		
104041	Differential and Integral Calculus 1M	5
104016	Algebra 1/Extended	5
114051	Physics 1	2.5
234128	Introduction to Computing with Python	4
324033	Technical English - Advanced B	3
	Total	**19.5**
Semester 2		
104043	Differential and Integral Calculus 2 M	5
104131	Ordinary Differential Equations/H	2.5
034028	Solid Mechanics 1	4
114081	Laboratory in Physics 1 H	1
125001	General Chemistry	3
314533	Introduction to Materials Engineering M1	3.5
394800	Physical Education Courses	1
	Total	**20**
Semester 3		
034053	Solid Mechanics 2 Extended	5
034061	Technical Drawing and Engineering Graphics	3.5
034056	Intro to Scient and Eng. Calculations	4
034035	Thermodynamics 1	4
104228	Partial Differential Equations	3
114052	Physics 2	3.5
035026	Creative Intro. in Mech Eng. (elective)	2.5
125013	General Chemistry Laboratory	0.5
	Total	**23.5**
Semester 4		
034030	Manufacturing Processes	3.5
034010	Dynamics	5
034055	Fluid flow Extended	5

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

034032	Linear systems	4
394800	Physical Education Courses	1
	Total	**18.5**
Semester 5		
034041	Heat Transfer	4
034040	Introduction to Control	3
034054	Mechanical Design 1M	4
034058	Probability and Statistics in Mech. Eng.	3
034051	Dynamics and Mechanics of Vibrations	3
	Total	**17**
Semester 6		
034057	Advanced Lab in Mech. Eng.	4
034371	Project in Design for Manufacturing	2.5
034060	Intro to Mechatronics, and Electric Motors	4
	Total	**10.5**
Semester 7		
Final Project: Part 1, one of the lists		
034379	Final Engineering Project 1	3
034355	Final Scientific Project 1	3
034353	Final Project New Product Design 1 *** *** should be together with the below course	3
034382	Methodology of Eng. Development 1	0.5
	Total	**9.5**
Semester 8		
Final Project: Part 2, one of the lists		
034380	Final Engineering project 2	3
034381	Final Scientific Project 2	3
034354	Final Project New Product Design 2 *** *** should be together with the below course	3
034383	Methodology of Eng. Development 2	0.5
	Total	**9.5**

MER Program Elective Courses		
Definition:	A. Computational Courses; B. Courses in Core Subjects; C. Applied and Integrative Courses; D. General Science Courses; E. General Elective Courses in the Department	
Course Code	**Course Name**	**Credits**
A. Computational Courses		
035022	Finite Elements for Engineering Analysis [R]*	3.0
035013	Computational Methods in Mech. Eng.	2.5
035199	Computational Fluid Dynamics	3.0
036015	Finite Element Methods in Mech. Eng. 1*	3.0
035039	Signal Processing	3.0
*One should take only one course from either 036015 or 035022.		
B. Courses in Core Subjects		
035188	Control Theory [R]	3.5
035001	Introduction to Robotics [R]	2.5
036049	Neural Networks for Control and Diagnostic	2.5
035091	Thermodynamics 2	3.5
036009	Heat and Mass Transfer	3.0
035035	Fluid Mechanics 2	2.5
036005	Analytical Dynamics	3.0
035003	Computer-Aided Design Systems	3.0
034016	Mechanical Engineering Design 2	3.0
035123	Intro to Manufacturing Systems 1	2.5
035043	Intro to the Theory of Elasticity	3.0
035041	Mechanics of Microsystems	3.5
035034	Failure of Materials	2.5
035050	Optical Systems Design	3.5
035052	Linear Optics and Applications 1	3.5
035062	Analysis of Structures	2.5
C. Applied and Integrative Courses		
034401	Advanced Robotics Lab [R]	2.5
035026	Creative Intro. in Mech Eng.	2.5
035032	Microprocessor-Based Product Design	3.0
034404	Advanced Computer-Aided Design Lab	2.0
034406	Advanced Control and Automation Lab	2.5
034410	Advanced Energy Lab	2.5
034411	Internal Combustion Engines Lab	2.5
034413	Design and Manufacturing Lab	2.0

034420	Advanced Lab in Renewable Energy	2.5
034422	Optics Lab	2.5
035048	Integrated Design and Analysis	2.5
035051	Optimal-Mechanical Design	4.0
036063	Experimental Modeling of Systems	3.0
034047	Advanced Lab in Fluid Mechanics	2.0
036027	Dynamics of Marine Structures	3.0
D. General Science Courses		
036001	Analytical Methods 1	4.0
104215	Complex Functions A	2.5
E. General Elective Courses in the Department		
035008	Industrial Automation	2.5
035036	Control System Design [R]	2.5
035033	Intro to Sensor-Integrated Systems[R]	3.0
236327	Digital Img. & Sig. Processing [R]	3.0
035010	Kinematics of Mechanisms [R]	2.5
036026	Kine., Dyn. Control of Robots [R]	2.5
036087	Hybrid Dynamics	3.0
034205	Pneum.&Hydrau. Components 1	3.0
035053	Renewable and Sus. Energy	3.0
036038	Interfacial Transport Processes	3.0
035146	Intro to Internal Comb Engines	2.5
086284	Wind Turbines	3.0
Graduate Level Course List offered to both Undergraduate & Graduate students		
036009	Heat and Mass Transfer	3.0
036049	Neural Networks for Control and Diagnostic	2.5
036001	Analytical Methods 1	4.0
036038	Interfacial Transport Processes	3.0
036026	Kine., Dyn. Control of Robots [R]	2.5
036087	Hybrid Dynamics	3.0

*Courses with R superscript are robotics-related.