

西北工业大学 本科人才培养方案

专业名称 材料科学与工程

首席教授（教学负责人）签字

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西北工业大学教务处制

材料科学与工程专业 2020 级本科生培养方案

一、专业概况

材料是人类赖以生存的物质基础，材料科学与工程是百业之基，奠定了航空航天、海洋工程、新能源、信息技术、可再生资源、智能制造等领域科学研究和产业发展的基础，是一个涉及材料学、工程学、物理、化学等方面的宽口径、厚基础专业。伦敦玛丽女王大学材料专业是其最有影响力的学科专业之一，核心理念是围绕材料组织、结构、性能关系及材料设计、成型、应用等全流程为学生提供精英质素教育和卓越专业教育，多次被英国政府评为 5 星级，2011 年全国学生联合会发起的调查显示其在全英排名第一。西北工业大学材料学科在国际上享有盛誉，为国家一级重点学科，2012 年学科评估全国排名第三，拥有 6 个国家级科研与人才培养平台。

为了借鉴英国高等教育培养创新型本科人才的先进理念和模式，在本土为中国学生提供正宗的英式高等本科教育，经教育部批准，西北工业大学与伦敦玛丽女王大学进行中外合作办学，中西合璧，强强联合，成立伦敦玛丽女王大学工程学院，创办的材料科学与工程专业（080401H）充分利用两校在材料领域的优势教育资源和高水平国际合作平台，整体引进英方课程体系、教学内容、考核模式，依托双方优质师资进行合作办学，采用国际化教学模式，培养具有国际视野、通晓国际规则，具有坚实的自然科学基础、材料科学与工程专业基础和人文基础，专业竞争力强、综合素质高，能够进行跨国学习、工作并具备终生学习能力的复合型创新人才。

二、培养目标

培养目标：本专业坚持培养具有国际视野、通晓国际规则，具有坚实的自然科学基础、材料科学与工程专业基础和人文基础，专业竞争力强、综合素质高，能够进行跨国学习、工作并具备终生学习能力的复合型创新人才。完成学业的学生有能力在世界名校深造攻读学位或就职于全球知名企业和国际组织。

内涵（一）具备扎实的基础知识和专业技能

培养学生掌握扎实的材料科学与工程基本原理，材料制备、表征、成型，及产品设计和应用开发等方面的基础知识；掌握工程及材料科学领域的实验和计算方法；具备研究和分析金属材料、无机非金属材料、复合材料及先进功能材料的组织、结构、性能关系的能力；能够创新性地利用基础知识和专业技能专业知识进行材料研究和工程实践，具有创造性解决专业领域技术问题的能力。

内涵（二）具备国际化能力

培养学生具有较高的英语水平，能够熟练阅读本专业英文材料、运用英文进行专业写作和技术交流；通过全英文培养模式、海外实习等途径培养学生能够获取、处理和运用信息，具备宽广的国际化视野、了解国际惯例；培养学生具有创新意识和竞争力，能够进行跨文化交流、沟通和合作；培养学生正确认识中国特色和国际比较，全面客观认识当代中国、看待外部世界。

内涵（三）具备终身学习能力

培养学生弘扬并践行社会主义核心价值观；正确认识时代责任和历史使命；正确认识远大抱负和脚踏实地；有高度的社会责任感、健全的人格品质、突出的交流和实践能力，具有团队合作意识、领导能力以及沟通能力；具有较强的语言组织能力和文案写作能力，能够就复杂工程与科学问题与业界同行及社会公众进行有效沟通和交流；具有工科伦理意识，以造福人类和可持续发展为理念，能够适应动态变化及时掌握材料领域的前沿知识和发展动态，在实践中持续提升自身素质。

三、思政育人

贯彻落实立德树人根本任务，用新时代中国特色社会主义思想铸魂育人，着力培养学生的家国情怀。充分发挥和利用材料科学与工程应用广泛性，实用性强的特点，将课程知识点与国家重大工程，以及人物事迹有机结合，通过课上课外以及新媒体多维载体等多样化教学方式，强化价值引领，把思想政治工作贯穿教育教学全过程。既要实现知识传授的过程生动，也要实现思政德育过程的接地气，做到以理服人，以事服人，在培养学生具有扎实专业基础知识同时引导学生树立社会主义核心价值观和爱国主义精神，不断提高学生思想道德情操，提高学生服务国家服务人民的社会责任感和时代使命感。

四、毕业要求（学生核心能力）

要求 1 基础知识掌握

要求学生掌握：材料科学领域广泛的基础知识，包括材料学、材料工程、材料结构与性能、材料加工与应用等；深入的专业知识，包括金属材料、无机非金属材料、复合材料、聚合物材料、可再生能源材料；工程及材料科学领域的实验和计算方法。

要求 2 专业技能培养

要求学生能够：综合运用材料科学知识与技术解决理论和实际问题，理解材料科学对工程及其他技术的重要性；制定实验方案、进行实验、分析和评估实验结果；熟悉材料实验、测试及分析设备、加工成型设备，在保证安全的前提下进行操作；检索、收集、筛选数据，准备科学和技术报告；具备材料科学与工程及相关领域科学研究、技术开发等方面的能力。

要求 3 综合素质培养

要求学生：具备较强的国际化能力和终身学习能力；独立自主的学习能力和工作能力；团队合作能力、领导能力以及沟通能力；对信息做出其相关性、重要性和可靠性判断的能力；了解科学对社会及全球未来的影响；具有创新意识和国际竞争力，能够进行跨文化交流、沟通和合作；具备可持续发展理念，能够适应材料领域前沿科技动态变化，在实践中持续提高自身素质。

五、学制与学位授予

学制：本科学制四年（4+0），按照学分制管理。

学位：学生通过全部课程并合格后，将获得西北工业大学本科毕业证书、工学学士学位证书，伦敦玛丽女王大学工学学士学位证书。

六、学分学时

总学分：167.5+X 学分

其中：

课程类别	建议学分
通识课程	62 学分
学科专业课程	105.5 学分
合计学分	167.5 学分

个性发展课程	X
素质拓展课程	

七、课程体系设置

（通识课程、学科专业课程总学分 167.5；个性发展课程、素质拓展课程总学分为 X）

1. 通识课程 62.0 学分

（1）思想政治理论类 16.0 学分

课程编码	课程名称	学分	课程性质
U44G11001	思政课 I-中国近现代史纲要	3.0	必修
U13G11007	思政课 II-马克思主义基本原理	3.0	必修
U13G11012	思政课 III-思想道德修养与法律基础	3.0	必修
U44G11004	思政课 IV-毛泽东思想和中国特色社会主义理论体系概论	5.0	必修
U13G11013	形势与政策	2.0	必修

（2）军事类 4.0 学分

课程编码	课程名称	学分	课程性质
U34G11005	军事理论	2.0	必修
U34P41002	军事技能训练	2.0	必修

（3）体育与健康类 6.0 学分

课程编码	课程名称	学分	课程性质
U34G11004	大学生心理健康教育	2.0	必修
	具体项目课程，详见体育部当学期开设课程	4.0	限选
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体育课第 1-4 学期为必修课，不同专业、不同体质、不同兴趣爱好、不同基础条件学生大二期间可以选择不同的项目。毕业时必须达到学校体育合格 421X 标准，即修满 4 个体育必修学分；掌握 2 项运动技能并取得技能合格证书（其中一项为游泳）；达到《国家学生体质健康标准》合格要求，取得 1 张体质健康等级证书；学生本科期间可根据个人兴趣修读体育类素质拓展课程，获得 X 体育素质学分。

（4）审美与艺术类

4.0 学分

课程编码	课程名称	学分	课程性质
U30L21046	大学美育	2.0 学分	必修
U30L11001	艺术导论	2.0 学分	限选
U30L11002	音乐鉴赏	2.0 学分	限选
U30L11003	美术鉴赏	2.0 学分	限选
U30L11004	影视鉴赏	2.0 学分	限选
U30L11005	书法鉴赏	2.0 学分	限选
U30L11006	戏剧鉴赏	2.0 学分	限选
U30L11007	戏曲鉴赏	2.0 学分	限选
U30L11008	舞蹈鉴赏	2.0 学分	限选

为限选课程，包含《大学美育》和艺术类课组，共计 4 学分；其中《大学美育》课程为必修，2 学分；所有学生应在教育部指定的八门艺术限定性选修课组中至少修读 2 学分。

（5）语言类

9.0 学分（公共英语课程不少于 4 学分（英语、德语 专业除外））

课程编码	课程名称	学分	课程性质
QXU3101	英语 I	3.5 学分	必修
QXU3102	英语 II	5.5 学分	必修

(6) 数学与自然科学类

23.0 学分

课程编码	课程名称	学分	课程性质
NXC3000	高等数学 I	5.5	必修
NXC3004	高等数学 II	5.5	必修
NXC3002	线性代数	3.0	必修
NXC3005	数学建模与计算	4.0	必修
NXC3001	大学物理	5.0	必修

2. 学科专业课程

105.5 学分

(1) 学科基础课程

7 学分

课程编码	课程名称	学分	课程性质
NXC4012	工程力学	3.5	必修
NXC4008	工程设计方法	3.5	必修

(2) 专业核心课程

89.5 学分

课程编码	课程名称	学分	课程性质
QXU3111	个人发展规划 I	3.5	必修
QXU4111	个人发展规划 II	3.5	必修
QXU5111	个人发展规划 III	3.5	必修
QXU4000	材料学 I-结构与性能	3.5	必修
QXU4006	材料学 II-加工与应用	3.5	必修
QXU4001	材料分子学	3.5	必修
NXC5010	功能材料	3.5	必修
QXU4011	工程材料概论	4.0	必修
QXU4007	材料学实验 I	3.5	必修
QXU5017	材料学实验 II	3.5	必修

NXC4022	热力学与相变	3.5	必修
QXU4002	材料化学	4.0	必修
QXU5010	表面与界面	3.5	必修
NXC5015	结构表征	3.5	必修
NXC5026	金属 I-变形与强化	3.5	必修
QXU5030	复合材料	3.5	必修
QXU5032	高分子材料物理性能	4.0	必修
NXC5036	金属 II-合金与热处理	3.5	必修
QXU6002	材料设计与选择	4.0	必修
QXU6007	材料的环境性能	3.5	必修
QXU6022	陶瓷	4.0	必修
NXC6023	疲劳与蠕变	3.0	必修
NXC6024	断裂力学	3.0	必修
NXC6025	制造技术	4.0	必修
QXU7027	可再生能源材料	3.5	必修

(3) 实践实训 1 学分

包含创新创业项目、创新性实验项目、学科竞赛、高峰体验计划、科研实践类活动等。并鼓励学生选择参与海外实习、课外实践、冬令营、夏令营等多种实践形式。

(4) 毕业设计/论文 8 学分

课程编码	课程名称	学分	课程性质
QXU6021	材料专业毕业设计	8.0 学分	必修

劳动教育主要依托毕业设计/论文，其中劳动教育学时 32 学时，引导学生锤炼劳动品质、养成劳动习惯，形成正确的劳动价值观。

3. 个性发展课程（共 6.0 学分，至少 4 门课程，建议选修授课语言为英语的课程）

(1) 综合素养类课程

(2) 学科拓展类课程

(3) 辅修/双学位专业课程

(4) 学术深造类课程

课程编码	课程名称	学分	课程性质
NXC1001	京剧艺术的呈现	1.0	任选
NXC1002	工笔画临摹与创作	1.0	任选
NXC1003	走进国乐	1.0	任选
U01L11001	航空概论	1.0	任选
U02L11001	航天概论	1.0	任选
NXC1004	计算机基础	1.0	任选
NXC1005	无机化学	2.0	任选
NXC1006	基础有机化学	2.0	任选
NXC1007	物理化学	2.0	任选
NXC1008	西方哲学史	2.0	任选
NXC1009	3D 打印	1.0	任选
NXC1010	科技英语文献写作	1.5	任选
NXC1011	工程素养-工程基础实践	2.0	任选
NXC1012	工程素养—智能机器人系统教学与创新实践	2.0	任选
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建议学生选修英文授课课程，包含科学素养类课程、经管法类课程、人文素养类课程、艺术素养类课程四个模块，每学期开设的上述模块课程详见当学期选课手册。

A. 科学素养类课程：包含三航概论、环境、生物等自然科学，其中在“航空概论”、“航天概论”、“航海概论”课程中必须三选一；计算机基础课程必修。

B. 经管法类课程：包含经济、管理、法学等。

C. 人文素养类课程：包含哲学、伦理、历史、文化、语言、文学、社会、审美、人生与发展等。

D. 艺术素养类课程：包含《艺术导论》《音乐鉴赏》《美术鉴赏》《影视鉴赏》《戏剧鉴赏》《舞蹈鉴赏》《书法鉴赏》《戏曲鉴赏》等课程，其中《京剧艺术的呈现》课程必修。

4. 素质拓展课程

(1) 思想教育活动

- (2) 公益活动
- (3) 创新创业活动
- (4) 文体活动
- (5) 社会实践活动
- (6) ...

八、课程体系对培养目标、毕业要求的支撑关系矩阵

通识课程

课程类别	课程名称	培养目标			毕业要求		
		内涵 1	内涵 2	内涵 3	要求 1	要求 2	要求 3
思想政治理论类	中国近现代史纲要		√	√			√
	马克思主义基本原理		√	√			√
	思想道德修养与法律基础		√	√			√
	毛泽东思想和中国特色社会主义理论体系概论		√	√			√
	形势与政策		√	√			√
军事类	军事理论		√	√			√
	军事技能训练		√	√			√
体育与健康类	大学生心理健康教育		√	√			√
	体育专项课		√	√			√
审美与艺术类	大学美育		√	√			√
	艺术限定性选修课		√	√			√
语言类	英语		√	√	√		
数学与自然科学类	高等数学 1	√	√	√	√		
	高等数学 2	√	√	√	√		
	线性代数	√	√	√	√		
	数学建模与计算	√	√	√	√		
	大学物理	√	√	√	√		

学科专业课程

课程类别	课程名称	培养目标			毕业要求		
		内涵 1	内涵 2	内涵 3	要求 1	要求 2	要求 3
学科基础课程	工程力学	√	√	√		√	√
	工程设计方法	√	√	√		√	√
专业核心课程	个人发展规划 I		√	√			√
	个人发展规划 II		√	√			√
	个人发展规划 III		√	√			√
	材料学 I-结构与性能	√	√	√	√	√	√
	材料学 II-加工与应用	√	√	√	√	√	√
	材料分子学	√	√	√	√	√	√
	功能材料	√	√	√	√	√	√
	工程材料概论	√	√	√	√	√	√
	材料学实验 I	√	√	√	√	√	√
	材料学实验 II	√	√	√	√	√	√
	热力学与相变	√	√	√	√	√	√
	材料化学	√	√	√	√	√	√
	表面与界面	√	√	√	√	√	√
	结构表征	√	√	√	√	√	√
	金属 I-变形与强化	√	√	√	√	√	√
	复合材料	√	√	√	√	√	√
	高分子材料物理性能	√	√	√	√	√	√
	金属 II-合金与热处理	√	√	√	√	√	√
	材料设计与选择	√	√	√	√	√	√
	材料的环境性能	√	√	√	√	√	√
	陶瓷	√	√	√	√	√	√
	疲劳与蠕变	√	√	√	√	√	√
	断裂力学	√	√	√	√	√	√

课程类别	课程名称	培养目标			毕业要求		
		内涵 1	内涵 2	内涵 3	要求 1	要求 2	要求 3
	制造技术	√	√	√	√	√	√
	可再生能源材料	√	√	√	√	√	√
实践实训	科研训练		√	√		√	√
毕业设计/论文	材料专业毕业设计		√	√		√	√

个性发展课程

课程类别	课程名称	培养目标			毕业要求		
		内涵 1	内涵 2	内涵 3	要求 1	要求 2	要求 3
综合素养类课程	每学期开设的上述模块课程 详见当学期选课手册	√	√	√			√
学科拓展类课程		√	√	√		√	√
辅修/双学位专业课		√	√	√		√	√
学术深造类课程		√	√	√		√	√

素质拓展课程

课程类别	课程名称	培养目标			毕业要求		
		内涵 1	内涵 2	内涵 3	要求 1	要求 2	要求 3
思想教育活动	每学期开设的上述模块课程 详见当学期选课手册	√	√	√			√
公益活动		√	√	√			√
创新创业活动		√	√	√			√
文体活动		√	√	√			√
社会实践活动		√	√	√			√
.....							

九、指导性教学计划

材料科学与工程专业 2020 级本科指导性教学计划

课程模块	课程类别	课程代码	课程名称	课程属性	学分	学时	说明
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课程模块	课程类别	课程代码	课程名称	课程属性	学分	学时	说明
通识课程	思想政治理论类	U44G11001	思政课 I-中国近现代史纲要	通识通修	3.0	48	
		U13G11007	思政课 II-马克思主义基本原理	通识通修	3.0	48	
		U13G11012	思政课 III-思想道德修养与法律基础	通识通修	3.0	48	
		U44G11004	思政课 IV-毛泽东思想和中国特色社会主义理论体系概论	通识通修	5.0	80	
		U13G11013	形势与政策	通识通修	2.0	32	
	军事类	U34G11005	军事理论		2.0	32	
		U34P41002	军事技能训练		2.0	120	
	体育与健康类	U34G11004	大学生心理健康教育		2.0	32	毕业时学生应通过《国家学生体质健康标准》的合格测试且获得西北工业大学体质健康等级证书,并通过两项运动技能考核或认定(其中一项为游泳)
		详见当学期开设课程	体育专项课		1.0	32	
		详见当学期开设课程	体育专项课		1.0	32	
		详见当学期开设课程	体育专项课		1.0	32	
		详见当学期开设课程	体育专项课		1.0	32	
	审美与艺术类	U30L21046	大学美育		2.0	32	为限选课程,包含《大学美育》和艺术类课组,共计4学分;其中《大学美育》课程为必修,2学分;所有学生应在教育部指定的

课程模块	课程类别	课程代码	课程名称	课程属性	学分	学时	说明
							八门艺术限定性选修课组中至少修读 2 学分。
		U30L11001/2/3/4/5/6/7/8	教育部指定的八门艺术限定性选修课		2.0	32	
	语言类	QXU3101	英语Ⅰ		3.5	56	
		QXU3102	英语Ⅱ		5.5	88	
	数学与自然科学类	NXC3000	高等数学Ⅰ		5.5	88	
		NXC3004	高等数学Ⅱ		5.5	88	
		NXC3001	大学物理		5.0	82	
		NXC3002	线性代数		3.0	48	
		NXC3005	数学建模与计算		4.0	64	
	合计学分		1146/62				
学科专业课程	学科基础课程（含相关实验实践课程）	NXC4012	工程力学		3.5	56	
		NXC4008	工程设计方法		3.5	56	
	专业核心课程（含相关实验实践课程、专业综合设计类课程）	QXU3111	个人发展规划Ⅰ		3.5	56	
		QXU4111	个人发展规划Ⅱ		3.5	56	
		QXU5111	个人发展规划Ⅲ		3.5	56	
		QXU4000	材料学Ⅰ-结构与性能		3.5	56	
		QXU4006	材料学Ⅱ-加工与应用		3.5	56	
		QXU4001	材料分子学		3.5	56	
		NXC5010	功能材料		3.5	56	
		QXU4011	工程材料概论		4.0	64	
		QXU4007	材料学实验Ⅰ		3.5	56	
		QXU5017	材料学实验Ⅱ		3.5	56	
		NXC4022	热力学与相变		3.5	56	
		QXU4002	材料化学		4.0	64	

课程模块	课程类别	课程代码	课程名称	课程属性	学分	学时	说明
		QXU5010	表面与界面		3.5	56	
		NXC5015	结构表征		3.5	56	
		NXC5026	金属 I-变形与强化		3.5	56	
		QXU5030	复合材料		3.5	56	
		QXU5032	高分子材料物理性能		4.0	64	
		NXC5036	金属 II-合金与热处理		3.5	56	
		QXU6002	材料设计与选择		4.0	64	
		QXU6007	材料的环境性能		3.5	56	
		QXU6022	陶瓷		4.0	64	
		NXC6023	疲劳与蠕变		3.0	48	
		NXC6024	断裂力学		3.0	48	
		NXC6025	制造技术		4.0	64	
		QXU7027	可再生能源材料		3.5	56	
	实践实训 (含创新创业实践)		科研训练		1.0	16	
	毕业设计/ 论文	QXU6021	材料专业毕业设计		8.0	128	
合计学分		1688/105.5					
个性 发展 课程 (选 修 课 程)		NXC1001	京剧艺术的呈现	学生可在西北工业大学综合素养类课程清单及玛丽女王工程学院选修课清单中选修，每学期开设的上述课程详见当学期选课手册。			
		NXC1002	工笔画临摹与创作				
		NXC1003	走进国乐				
		U01L11001	航空概论				
		U02L11001	航天概论				
		U03L11001	航海概论				
		NXC1004	计算机基础				
		NXC1005	无机化学				
		NXC1006	基础有机化学				

课程模块	课程类别	课程代码	课程名称	课程属性	学分	学时	说明
		NXC1007	物理化学				
		NXC1008	西方哲学史				
		NXC1009	3D 打印				
					
合计		96/6.0					
总学时/学分合计: 2930/173.5							
附注说明: 课程代号 QX 为英方教师授课, NX 为中方教师英文授课, U 为教育部规定必修中文授课的军事理论课程及部分中文选修课程等							

西北工业大学
本科人才培养方案

专业名称 高分子材料与工程

首席教授（教学负责人）签字

年 月 日

西北工业大学教务处制

高分子材料与工程专业 2020 级本科生培养方案

一、专业概况

高分子材料是材料学与软物质科学的前沿交叉学科，奠定了航空航天、新能源、可持续发展、生命科学、健康与医疗、信息技术、智能制造等领域科学研究和产业发展的基础。高分子材料与工程专业是一个涉及化学、材料、工程学等方面的宽口径、厚基础的热门工科本科专业。伦敦玛丽女王大学材料专业是其最有影响力的学科专业之一，涵盖高分子、复合材料、金属和陶瓷等领域，核心理念是围绕材料组织、结构、性能关系及材料设计、成型、应用等全流程为学生提供精英质素教育和卓越专业教育，多次被英国政府评为 5 星级，2011 年全国学生联合会发起的调查显示其在全英排名第一。西北工业大学材料学科在国际上享有盛誉，为国家一级重点学科，2012 年学科评估全国排名第三。高分子材料与工程专业为陕西省名牌专业、特色专业。

为了借鉴英国高等教育培养创新型本科人才的先进理念和模式，在本土为中国学生提供正宗的英式高等本科教育，经教育部批准，西北工业大学与伦敦玛丽女王大学进行中外合作办学，中西合璧，强强联合，成立伦敦玛丽女王大学工程学院，创办的高分子材料与工程专业（080407H）充分利用两校在材料、工程、化学等领域的优势教育资源和高水平国际合作平台，整体引进英方课程体系、教学内容、考核模式，依托双方优质师资进行合作办学，采用国际化教学模式，培养具有国际视野、通晓国际规则，具有坚实的高分子材料与工程科学基础、专业基础和人文基础，专业竞争力强、综合素质高，能够进行跨国学习、工作并具备终生学习能力的复合型创新人才。

二、培养目标

培养目标：本专业坚持培养具有国际视野、通晓国际规则，具有坚实的自然科学基础、材料科学与工程专业基础和人文基础，专业竞争力强、综合素质高，能够进行跨国学习、工作并具备终生学习能力的复合型创新人才。完成学业的学生有能力在世界名校深造攻读学位或就职于全球知名企业和国际组织。

内涵（一）具备扎实的基础知识和专业技能

培养学生掌握扎实的材料科学与工程基本原理，材料制备、表征、成型，及产品设计和应用开发等方面的基础知识；掌握工程及材料科学领域的实验和计算方法；具备研究和分析金属材料、无机非金属材料、复合材料及先进功能材料的组织、结构、性能关系的能力；能够创新性地利用基础知识和专业技能专业知识进行材料研究和工程实践，具有创造性解决专业领域技术问题的能力。

内涵（二）具备国际化能力

培养学生具有较高的英语水平，能够熟练阅读本专业英文材料、运用英文进行专业写作和技术交流；通过全英文培养模式、海外实习等途径培养学生能够获取、处理和运用信息，具备宽广的国际化视野、了解国际惯例；培养学生具有创新意识和竞争力，能够进行跨文化交流、沟通和合作；培养学生正确认识中国特色和国际比较，全面客观认识当代中国、看待外部世界。

内涵（三）具备终身学习能力

培养学生弘扬并践行社会主义核心价值观；正确认识时代责任和历史使命；正确认识远大抱负和脚踏实地；有高度的社会责任感、健全的人格品质、突出的交流和实践能力，具有团队合作意识、领导能力以及沟通能力；具有较强的语言组织能力和文案写作能力，能够就复杂工程与科学问题与业界同行及社会公众进行有效沟通和交流；具有工科伦理意识，以造福人类和可持续发展为理念，能够适应动态变化及时掌握材料领域的前沿知识和发展动态，在实践中持续提升自身素质。

三、思政育人

贯彻落实立德树人根本任务，用新时代中国特色社会主义思想铸魂育人，着力培养学生的家国情怀。充分发挥和利用材料科学与工程应用广泛性，实用性强的特点，将课程知识点与国家重大工程，以及人物事迹有机结合，通过课上课外以及新媒体多维载体等多样化教学方式，强化价值引领，把思想政治工作贯穿教育教学全过程。既要实现知识传授的过程生动，也要实现思政德育过程的接地气，做到以理服人，以事服人，在培养学生具有扎实专业基础知识同时引导学生树立社会主义核心价值观和爱国主义精神，不断提高学生思想道德情操，提高学生服务国家服务人民的社会责任感和时代使命感。

四、毕业要求（学生核心能力）

要求 1 基础知识掌握

要求学生掌握：材料科学领域广泛的基础知识，包括材料学、材料工程、材料结构与性能、材料加工与应用等；深入的专业知识，包括金属材料、无机非金属材料、复合材料、聚合物材料、可再生能源材料；工程及材料科学领域的实验和计算方法。

要求 2 专业技能培养

要求学生能够：综合运用材料科学知识与技术解决理论和实际问题，理解材料科学对工程及其他技术的重要性；制定实验方案、进行实验、分析和评估实验结果；熟悉材料实验、测试及分析设备、加工成型设备，在保证安全的前提下进行操作；检索、收集、筛选数据，准备科学和技术报告；具备材料科学与工程及相关领域科学研究、技术开发等方面的能力。

要求 3 综合素质培养

要求学生：具备较强的国际化能力和终身学习能力；独立自主的学习能力和工作能力；团队合作能力、领导能力以及沟通能力；对信息做出其相关性、重要性和可靠性判断的能力；了解科学对社会及全球未来的影响；具有创新意识和国际竞争力，能够进行跨文化交流、沟通和合作；具备可持续发展理念，能够适应材料领域前沿科技动态变化，在实践中持续提高自身素质。

五、学制与学位授予

学制：本科学制四年（4+0），按照学分制管理。

学位：学生通过全部课程并合格后，将获得西北工业大学本科毕业证书、工学学士学位证书，伦敦玛丽女王大学工学学士学位证书。

六、学分学时

总学分：167.5+X 学分

其中：

课程类别	建议学分
通识课程	62 学分
学科专业课程	105.5 学分
合计学分	167.5 学分

个性发展课程	X
素质拓展课程	

七、课程体系设置

（通识课程、学科专业课程总学分 167.5；个性发展课程、素质拓展课程总学分为 X）

1. 通识课程 62.0 学分

（1）思想政治理论类 16.0 学分

课程编码	课程名称	学分	课程性质
U44G11001	思政课 I-中国近现代史纲要	3.0	必修
U13G11007	思政课 II-马克思主义基本原理	3.0	必修
U13G11012	思政课 III-思想道德修养与法律基础	3.0	必修
U44G11004	思政课 IV-毛泽东思想和中国特色社会主义理论体系概论	5.0	必修
U13G11013	形势与政策	2.0	必修

（2）军事类 4.0 学分

课程编码	课程名称	学分	课程性质
U34G11005	军事理论	2.0	必修
U34P41002	军事技能训练	2.0	必修

（3）体育与健康类 6.0 学分

课程编码	课程名称	学分	课程性质
U34G11004	大学生心理健康教育	2.0	必修
U31G71001	体育 I	1.0 学分	必修
U31G71002	体育 II	1.0 学分	必修

U31G71003	体育 III	1.0 学分	必修
U31G71004	体育 IV	1.0 学分	必修
.....

体育课第 1-4 学期为必修课，不同专业、不同体质、不同兴趣爱好、不同基础条件学生大二期间可以选择不同的项目。毕业时必须达到学校体育合格 421X 标准，即修满 4 个体育必修学分；掌握 2 项运动技能并取得技能合格证书（其中一项为游泳）；达到《国家学生体质健康标准》合格要求，取得 1 张体质健康等级证书；学生本科期间可根据个人兴趣修读体育类素质拓展课程，获得 X 体育素质学分。

课程编码	课程名称	学分	课程性质
U34G11004	大学生心理健康教育	2.0	必修
	具体项目课程，详见体育部当学期开设课程	4.0	限选
.....

体育课第 1-4 学期为必修课，不同专业、不同体质、不同兴趣爱好、不同基础条件学生大二期间可以选择不同的项目。毕业时必须达到学校体育合格 421X 标准，即修满 4 个体育必修学分；掌握 2 项运动技能并取得技能合格证书（其中一项为游泳）；达到《国家学生体质健康标准》合格要求，取得 1 张体质健康等级证书；学生本科期间可根据个人兴趣修读体育类素质拓展课程，获得 X 体育素质学分。

（4）审美与艺术类

4.0 学分

课程编码	课程名称	学分	课程性质
U30L21046	大学美育	2.0 学分	必修
U30L11001	艺术导论	2.0 学分	限选
U30L11002	音乐鉴赏	2.0 学分	限选
U30L11003	美术鉴赏	2.0 学分	限选
U30L11004	影视鉴赏	2.0 学分	限选
U30L11005	书法鉴赏	2.0 学分	限选

U30L11006	戏剧鉴赏	2.0 学分	限选
U30L11007	戏曲鉴赏	2.0 学分	限选
U30L11008	舞蹈鉴赏	2.0 学分	限选

为限选课程，包含《大学美育》和艺术类课组，共计 4 学分；其中《大学美育》课程为必修，2 学分；所有学生应在教育部指定的八门艺术限定性选修课组中至少修读 2 学分。

(5) 语言类

9.0 学分（公共英语课程不少于 4 学分（英语、德语 专业除外））

课程编码	课程名称	学分	课程性质
QXU3101	英语 I	3.5 学分	必修
QXU3102	英语 II	5.5 学分	必修

(6) 数学与自然科学类

23.0 学分

课程编码	课程名称	学分	课程性质
NXC3000	高等数学 I	5.5	必修
NXC3004	高等数学 II	5.5	必修
NXC3002	线性代数	3.0	必修
NXC3005	数学建模与计算	4.0	必修
NXC3001	大学物理	5.0	必修

2. 学科专业课程

105.5 学分

(1) 学科基础课程

7.0 学分

课程编码	课程名称	学分	课程性质
NXC4012	工程力学	3.5	必修
NXC4008	工程设计方法	3.5	必修

(2) 专业核心课程

89.5 学分

课程编码	课程名称	学分	课程性质
QXU3111	个人发展规划 I	3.5	必修
QXU4111	个人发展规划 II	3.5	必修
QXU5111	个人发展规划 III	3.5	必修
NXC4122	热力学和流体力学	3.5	必修
QXU4000	材料学 I-结构与功能	3.5	必修
QXU4001	材料分子学	3.5	必修
QXU4006	材料学 II-加工与应用	3.5	必修
NXC5010	功能材料	3.5	必修
QXU4011	工程材料概论	4.0	必修
QXU4007	材料学实验 I	3.5	必修
QXU5017	材料学实验 II	3.5	必修
QXU5010	表面和界面	3.5	必修
QXU4003	高分子化学	4.0	必修
QXU5032	高分子材料物理性能	4.0	必修
NXC5013	高分子表征	3.5	必修
NXC5014	弹性体材料	3.5	必修
NXC5028	高分子降解	3.5	必修
QXU5030	复合材料	3.5	必修
QXU6002	材料设计与选择	4.0	必修
QXU6007	材料的环境性能	3.5	必修
NXC6018	高分子成型	4.0	必修
NXC6019	高分子失效	3.0	必修
NXC6020	高分子产品设计	3.0	必修
QXU6034	功能高分子	3.5	必修
QXU7033	先进高分子合成	4.0	必修

(3) 实践实训

1.0 学分

包含创新创业项目、创新性实验项目、学科竞赛、高峰体验计划、科研实践类活动等。并鼓励学生选择参与海外实习、课外实践、冬令营、夏令营等多种实践形式。

(4) 毕业设计/论文 8.0 学分

课程编码	课程名称	学分	课程性质
QXU6035	高分子专业毕业设计	8.0 学分	必修

劳动教育主要依托毕业设计/论文，其中劳动教育学时 32 学时，引导学生锤炼劳动品质、养成劳动习惯，形成正确的劳动价值观。

3. 个性发展课程（共 6.0 学分，至少 4 门课程，建议选修授课语言为英语的课程）

- (1) 综合素养类课程
- (2) 学科拓展类课程
- (3) 辅修/双学位专业课程
- (4) 学术深造类课程

课程编码	课程名称	学分	课程性质
NXC1001	京剧艺术的呈现	1.0	任选
NXC1002	工笔画临摹与创作	1.0	任选
NXC1003	走进国乐	1.0	任选
U01L11001	航空概论	1.0	任选
U02L11001	航天概论	1.0	任选
NXC1004	计算机基础	1.0	任选
NXC1005	无机化学	2.0	任选
NXC1006	基础有机化学	2.0	任选
NXC1007	物理化学	2.0	任选
NXC1008	西方哲学史	2.0	任选
NXC1009	3D 打印	1.0	任选
NXC1010	科技英语文献写作	1.5	任选
NXC1011	工程素养-工程基础实践	2.0	任选
NXC1012	工程素养—智能机器人系统教学与	2.0	任选

	创新实践		
.....

建议学生选修英文授课课程，包含科学素养类课程、经管法类课程、人文素养类课程、艺术素养类课程四个模块，每学期开设的上述模块课程详见当学期选课手册。

A. 科学素养类课程：包含三航概论、环境、生物等自然科学，其中在“航空概论”、“航天概论”、“航海概论”课程中必须三选一；计算机基础课程必修。

B. 经管法类课程：包含经济、管理、法学等。

C. 人文素养类课程：包含哲学、伦理、历史、文化、语言、文学、社会、审美、人生与发展等。

D. 艺术素养类课程：包含《艺术导论》《音乐鉴赏》《美术鉴赏》《影视鉴赏》《戏剧鉴赏》《舞蹈鉴赏》《书法鉴赏》《戏曲鉴赏》等课程，其中《京剧艺术的呈现》课程必修。

4. 素质拓展课程

- (1) 思想教育活动
- (2) 公益活动
- (3) 创新创业活动
- (4) 文体活动
- (5) 社会实践活动
- (6) ...

八、课程体系对培养目标、毕业要求的支撑关系矩阵

通识课程

课程类别	课程名称	培养目标			毕业要求		
		内涵 1	内涵 2	内涵 3	要求 1	要求 2	要求 3
思想政治理论类	中国近现代史纲要		√	√			√
	马克思主义基本原理		√	√			√
	思想道德修养与法律基础		√	√			√
	毛泽东思想和中国特色社 会主义理论体系概论		√	√			√

课程类别	课程名称	培养目标			毕业要求		
		内涵 1	内涵 2	内涵 3	要求 1	要求 2	要求 3
	形势与政策		√	√			√
军事类	军事理论		√	√			√
	军事技能训练		√	√			√
体育与健康类	大学生心理健康教育		√	√			√
	体育专项课		√	√			√
审美与艺术类	大学美育		√	√			√
	艺术限定性选修课		√	√			√
语言类	英语		√	√	√		
数学与自然科学类	高等数学 1	√	√	√	√		
	高等数学 2	√	√	√	√		
	线性代数	√	√	√	√		
	数学建模与计算	√	√	√	√		
	大学物理	√	√	√	√		

学科专业课程

课程类别	课程名称	培养目标			毕业要求		
		内涵 1	内涵 2	内涵 3	要求 1	要求 2	要求 3
学科基础课程	工程力学	√	√	√		√	√
	工程设计方法	√	√	√		√	√
专业核心课程	个人发展规划 I		√	√			√
	个人发展规划 II		√	√			√
	个人发展规划 III		√	√			√
	热力学和流体力学	√	√	√	√	√	√
	材料学 I-结构与功能	√	√	√	√	√	√
	材料分子学	√	√	√	√	√	√
	材料学 II-加工与应用	√	√	√	√	√	√
	功能材料	√	√	√	√	√	√
	工程材料概论	√	√	√	√	√	√

课程类别	课程名称	培养目标			毕业要求		
		内涵 1	内涵 2	内涵 3	要求 1	要求 2	要求 3
	材料学实验 I	√	√	√	√	√	√
	材料学实验 II	√	√	√	√	√	√
	表面和界面	√	√	√	√	√	√
	高分子化学	√	√	√	√	√	√
	高分子材料物理性能	√	√	√	√	√	√
	高分子表征	√	√	√	√	√	√
	弹性体材料	√	√	√	√	√	√
	高分子降解	√	√	√	√	√	√
	复合材料	√	√	√	√	√	√
	材料设计与选择	√	√	√	√	√	√
	材料的环境性能	√	√	√	√	√	√
	高分子成型	√	√	√	√	√	√
	高分子失效	√	√	√	√	√	√
	高分子产品设计	√	√	√	√	√	√
	功能高分子	√	√	√	√	√	√
	先进高分子合成	√	√	√	√	√	√
实践实训	科研训练		√	√		√	√
毕业设计/论文	高分子专业毕业设计		√	√		√	√

个性发展课程

课程类别	课程名称	培养目标			毕业要求		
		内涵 1	内涵 2	内涵 3	要求 1	要求 2	要求 3
综合素养类课程	每学期开设的上述模块课程 详见当学期选课手册	√	√	√			√
学科拓展类课程		√	√	√		√	√
辅修/双学位专业课		√	√	√		√	√
学术深造类课程		√	√	√		√	√

素质拓展课程

课程类别	课程名称	培养目标			毕业要求		
		内涵 1	内涵 2	...	要求 1	要求 2	...
思想教育活动	每学期开设的上述模块课程详见当学期选课手册	√	√	√			√
公益活动		√	√	√			√
创新创业活动		√	√	√			√
文体活动		√	√	√			√
社会实践活动		√	√	√			√
.....		√	√	√			√

九、指导性教学计划

高分子材料与工程专业 2020 级本科指导性教学计划

课程模块	课程类别	课程代码	课程名称	课程属性	学分	学时	说明
通识课程	思想政治理论类	U44G11001	思政课 I-中国近现代史纲要	通识通修	3.0	48	
		U13G11007	思政课 II-马克思主义基本原理	通识通修	3.0	48	
		U13G11012	思政课 III-思想道德修养与法律基础	通识通修	3.0	48	
		U44G11004	思政课 IV-毛泽东思想和中国特色社会主义理论体系概论	通识通修	5.0	80	
		U13G11013	形势与政策	通识通修	2.0	32	
	军事类	U34G11005	军事理论		2.0	32	
		U34P41002	军事技能训练		2.0	120	
	体育与健康类	U34G11004	大学生心理健康教育		2.0	32	毕业时学生应通过《国家
		详见当学期开设课程	体育专项课		1.0	32	

课程模块	课程类别	课程代码	课程名称	课程属性	学分	学时	说明	
		详见当学期开设课程	体育专项课		1.0	32	学生体质健康标准》的合格测试且获得西北工业大学体质健康等级证书，并通过两项运动技能考核或认定（其中一项为游泳）	
		详见当学期开设课程	体育专项课		1.0	32		
		详见当学期开设课程	体育专项课		1.0	32		
	审美与艺术类	U30L21046	大学美育		2.0	32	为限选课程，包含《大学美育》和艺术类课组，共计 4 学分；其中《大学美育》课程为必修，2 学分；所有学生应在教育部指定的八门艺术限定性选修课组中至少修读 2 学分。	
		U30L11001/2/3/4/5/6/7/8	教育部指定的八门艺术限定性选修课		2.0	32		
	语言类	QXU3101	英语Ⅰ		3.5	56		
		QXU3102	英语Ⅱ		5.5	88		
	数学与自然科学类	NXC3000	高等数学Ⅰ		5.5	88		
		NXC3004	高等数学Ⅱ		5.5	88		
		NXC3001	大学物理		5.0	82		
		NXC3002	线性代数		3.0	48		
		NXC3005	数学建模与计算		4.0	64		
	合计学分		116/62					
	学科专业课程	学科基础课程（含相关实验实	NXC4012	工程力学		3.5	56	
NXC4008			工程设计方法		3.5	56		

课程模块	课程类别	课程代码	课程名称	课程属性	学分	学时	说明
	实践课程)						
	专业核心课程(含相关实验实践课程、专业综合设计类课程)	NXC4008	工程设计方法		3.5	56	
		NXC4012	工程力学		3.5	56	
		QXU3111	个人发展规划 I		3.5	56	
		QXU4111	个人发展规划 II		3.5	56	
		QXU5111	个人发展规划 III		3.5	56	
		NXC4122	热力学和流体力学		3.5	56	
		QXU4000	材料学 I-结构与功能		3.5	56	
		QXU4001	材料分子学		4.0	64	
		QXU4006	材料学 II-加工与应用		3.5	56	
		NXC5010	功能材料		3.5	56	
		QXU4011	工程材料概论		3.5	56	
		QXU5010	表面和界面		4.0	64	
		QXU4003	高分子化学		3.5	56	
		QXU5032	高分子材料物理性能		3.5	56	
		NXC5013	高分子表征		3.5	56	
		NXC5014	弹性体材料		3.5	56	
		NXC5028	高分子降解		4.0	64	
		QXU5030	复合材料		3.5	56	
		QXU6002	材料设计与选择		4.0	64	
		QXU6007	材料的环境性能		3.5	56	
		NXC6018	高分子成型		4.0	64	
		NXC6019	高分子失效		3.0	48	
		NXC6020	高分子产品设计		3.0	48	
		QXU6034	功能高分子		4.0	64	
		QXU7033	先进高分子合成		3.5	56	

课程模块	课程类别	课程代码	课程名称	课程属性	学分	学时	说明
	实践实训 （含创新创业实践）		科研训练		1.0	16	
	毕业设计/ 论文	QXU6021	材料专业毕业设计		8.0	128	
合计学分		1688/105.5					
个性发展课程 （选修课程）		NXC1001	京剧艺术的呈现	学生可在西北工业大学综合素养类课程清单及玛丽女王工程学院选修课清单中选修，每学期开设的上述课程详见当学期选课手册。			
		NXC1002	工笔画临摹与创作				
		NXC1003	走进国乐				
		U01L11001	航空概论				
		U02L11001	航天概论				
		U03L11001	航海概论				
		NXC1004	计算机基础				
		NXC1005	无机化学				
		NXC1006	基础有机化学				
		NXC1007	物理化学				
		NXC1008	西方哲学史				
		NXC1009	3D 打印				
					
合计		96/6.0					
总学时/学分合计： 2930/173.5							
附注说明：课程代号 QX 为英方教师授课，NX 为中方教师英文授课，U 为教育部规定必修中文授课的军事理论课程及部分中文选修课程等							

NPU Education Plan for Undergraduates

(QMUL Engineering School)

Name of Major Materials Science and Engineering

Chief Professor (Head of Teaching) sign _____

Y M D

From Teaching Affairs Department of Northwestern Polytechnical University

Materials Science and Engineering

Education Plan for 2020 Undergraduates

(QMUL Engineering School)

1. Major Introduction

Materials are the basic necessity of human existence. Materials science and engineering is the foundation of science, technology, and manufacturing. As a syncretic discipline hybridizing materials science, engineering, physics, and chemistry, materials science and engineering builds the foundation of aviation, marine engineering, new energy, information technology, renewable resources, and intelligent manufacturing. Materials discipline, which covers metals, ceramics, polymers, and composites, is one of the most influential and distinct disciplines in Queen Mary University of London (hereinafter as QMUL). The Materials plan of QMUL provides elite education and professional training for students with a thorough grounding in the structure of materials, the properties of materials, the performance of materials and the manufacturing processes and design. The discipline has been rated as 5-star by the British government many times. A survey conducted by the National Union of Students in 2011 showed that it ranked top 1 in the UK. The Materials plans in Northwestern Polytechnical University (hereinafter as NPU) enjoy a high reputation and a great popularity internationally. Materials Science and Engineering of NPU is the National Key Discipline and ranked top 3 among all National Key Disciplines in the 2012 Discipline Evaluation in China. NPU also has 6 scientific research and talent-training platforms at national level.

Approved by the Ministry of Education of China, NPU and QMUL have launched a joint educational institution named Queen Mary University of London Engineering School, Northwestern Polytechnical University (hereinafter referred to as JEI), in order to provide Chinese students with typical British education that emphasizes on developing undergraduate

students' innovation ability. The JEI, which builds on the acknowledged expertise and experience of the two universities and their complementary research strengths in materials science, fully uses educational resource advantages and high-level international cooperation platforms of both universities to provide a high quality degree level education in the plan of Materials Science and Engineering (080401H). The plan draws on the academic expertise of both institutions and adopts an international teaching mode with curriculum system, teaching materials, and assessment methods from the UK. The mission of this plan is to develop qualified and innovative talents who can study and work transnationally with the knowledge of natural science, materials science and engineering, and social science. Students graduate with comprehensive qualities, high professional competencies, a global horizon, a life-long study ability, and recognition of international rules.

2. Educational Aims

This plan aims to develop qualified and innovative talents who can study and work transnationally with the knowledge of natural science, materials science and engineering, and social science. Students graduate with comprehensive qualities, high professional competencies, a global horizon, a life-long study ability, and the recognition of international rules. Students who have completed their studies will be able to pursue higher degrees and research within universities in China and internationally or careers in the expanding materials science and manufacturing industry in world famous enterprises.

(1) Be equipped with solid basic knowledge and professional skills

Students should master basic principles in materials science and engineering, experimental and computing methods in the field of engineering and materials science, and knowledge of material design and making, material forming and shaping, product design, and application development. Students should be equipped with the ability to research and analyse the structure, the properties and the performance of metallic materials, inorganic nonmetallic materials, composite materials, and advanced materials. Students are able to solve technical problems in their professional field.

(2) Be equipped with international competitiveness

Students become highly proficient in English language: reading English materials and books in materials science, writing academic essays in English, and conducting technical presentations in English. The plan develops students' global horizon and the recognition of international rules via the British teaching mode and overseas internship plan. Students can obtain, use and manage various information to conduct cross-cultural communication and cooperation with innovative abilities and international competitiveness. Students can recognize Chinese characteristics and international comparisons correctly, as well as comprehend modern China and the world objectively and comprehensively.

(3) Be equipped with the ability of life-long study

Students should promote and practice Socialist Core Values, recognize the responsibility of times and mission of history, and to understand ambition and dedication correctly. Students should have a strong sense of social responsibility, a healthy mental and moral state, the ability of leading and working in teams, and outstanding communicative and practical skills. Equipped with good presentation skills and writing abilities, students can communicate effectively with their peers and the public about complex engineering and scientific problems. The cultivation of consciousness of engineering ethics, and the concept of working for the wellbeing of the human beings and sustainable development can help students to adapt to dynamic changes, and master the cutting-edge knowledge and new trends in the field of materials science so as to constantly improve students' abilities.

3. Ideological education

Implement the fundamental task of establishing virtues and educating people, use the thought of socialism with Chinese characteristics in the new era to shape the soul and educate people, and strive to cultivate students' national sentiments. Make full use of the wide application of materials science and engineering, strong practical characteristics. Combine the course knowledge and national major projects, as well as personal stories, through class and extracurricular as well as new media multidimensional carrier and other diversified teaching methods to strengthen value leadership. Hold the ideological and political work through the whole process of education and teaching. It is not only necessary to make the process of

knowledge transfer vivid, but also to make the process of ideological and political moral education as a common touch, so as to convince people with reason and convince people with facts, and to guide students to establish socialist core values and patriotism while cultivating solid professional knowledge, constantly improve students' ideological and moral sentiments, and enhance their sense of social responsibility and mission to serve the country and the people.

4. Graduation Requirements (Core Abilities of Students)

(1) Master basic knowledge

Students should master: extensive knowledge in the field of materials science including materials science and engineering, the structure of materials, the properties of materials, the performance of materials, the manufacturing processes and design, and application and development; intensive professional knowledge, including surfaces and interfaces, materials chemistry, polymer materials, ceramic materials, renewable materials, and sustainable development; experimental and computational methods in the field of engineering and materials science.

(2) Develop professional skills

Students should be equipped with creative problem-solving and transferable skills and recognize the important value of materials science to engineering and other technologies. On the premise of safety, students conduct various experiments practically and are able to design, conduct, analyze and evaluate experiments and the results. Theoretically, students are familiar with the operation of all kinds of equipment used in experiments, tests, and analysis and are capable of searching, collecting and selecting data and presenting scientific and technical report. At last, students should have related abilities to conduct scientific research and develop technology and products.

(3) Develop comprehensive qualities

Students should have the abilities of international competitiveness, communication, life-long study, independent study and work, and leading and working in teams. Students can

estimate the relevance, importance and reliability of various information and realize the influence of science and engineering on the future of the society worldwide. Students are capable of computing, analyzing and managing data, and communicating and cooperating transnationally with innovative ability and international competitiveness. With the concept of sustainable development in mind, students are exposed to cutting-edge technology changes in the field of materials and can improve themselves constantly in practice.

5. Qualification and Degree Certificate

Official length of the plan: 4+0 years' study in accordance with the credit management system.

Qualification and certificate: Successful students of the plan will be awarded diploma by NPU, BEng degree by NPU, and BEng degree by QMUL.

6. Credits and Hours

Total credits: 167.5+X credits

Includes:

Type of module	Credit
General education module	62
discipline module	105.5
Total credits	167.5
Comprehensive literacy module	X
comprehensive practices	

7. Curriculum System and Credits

(General education module and discipline module: 167.5 credits; Comprehensive literacy module and comprehensive practices module: X credits)

1. General education modules 62.0 credits

(1) Ideological and political theory modules 16.0 credits

Module Code	Module Name	Credit	Speciality of module
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U44G11001	Chinese compulsory courses I-Essentials of Chinese Modern History	3.0	compulsory module
U13G11007	Chinese compulsory courses II-Marxism General Principle	3.0	compulsory module
U13G11012	Chinese compulsory courses III-Ethics and Fundamental of Law	3.0	compulsory module
U44G11004	Chinese compulsory courses IV-Fundamental of Mao Ze Dong Thoughts	5.0	compulsory module
U13G11013	Situation and Policy	2.0	compulsory module

(2) Military modules 4.0 credits

Module Code	Module Name	Credit	Speciality of module
U34G11005	Military Theory	2.0	compulsory module
U34P41002	Military Training	2.0	compulsory module

(3) Mental growth and personal development modules 6.0 credits

Module Code	Module Name	Credit	Speciality of module
U34G11004	Students Mental Health Education	2.0	compulsory
	For specific program courses, see the current semester courses offered by the Physical Education Department	4.0	optional
.....

Physical Education is compulsory module in the first to the fourth semester, taking 1 credit every semester. Students can freely choose different module according to their majors, physical conditions, interesting and physical basis. Must meet the 421X standard of school

physical education qualification upon graduation, that is, complete 4 credits; students should be proficient in 2 sports skills and obtain a skill certificate (one of which is swimming). During the undergraduate period, students can study physical quality development module according to their personal interests and obtain X credits.

(4) Art literacy modules

4.0 credits

Module Code	Module Name	Credit	Speciality of module
U30L21046	College aesthetic education	2.0	compulsory module
U30L11001	An Introduction to Art	2.0	optional
U30L11002	Appreciation of classical music	2.0	optional
U30L11003	Appreciation Of Chinese and Europe Arts	2.0	optional
U30L11004	Film and Television Appreciation	2.0	optional
U30L11005	Calligraphy appreciation	2.0	optional
U30L11006	Appreciation of Drama	2.0	optional
U30L11007	Appreciation of Traditional Chinese Opera	2.0	optional
U30L11008	Appreciation of Dance	2.0	optional

They are limited elective courses including “College aesthetic education” and art literacy modules, for a total of 4 credits; among them, "College aesthetic education" is a compulsory course (2 credits); all students should take at least 2 credits in the eight art limited elective courses designated by the Ministry of Education.

(5) Language modules

9.0 credits (no less than 4 credits of Public English courses (except English Major & German Major))

Module code	Module name	Credit	Speciality of module
QXU3101	English Language I	3.5	compulsory
QXU3102	English Language II	5.5	compulsory

(6) Mathematics and Natural Science

23.0 credits

Module Code	Module Name	Credit	Speciality of module
NXC3000	Advanced Math 1	5.5	Compulsory
NXC3004	Advanced Math 2	5.5	Compulsory
NXC3002	Linear Algebra	3.0	Compulsory
NXC3005	Mathematical Modelling and Computing	4.0	Compulsory
NXC3001	General Physics	5.0	Compulsory

2. Discipline Modules

105.5 credits

(1) Discipline Elementary Modules

7.0 credits

Module Code	Module Name	Credit	Speciality of module
NXC4012	Mechanical Modelling	3.5	Compulsory
NXC4008	Engineering Design Methods	3.5	Compulsory

(2) Discipline core modules

89.5 credits

Module Code	Module Name	Credit	Speciality of module
QXU3111	PDP I	3.5	Compulsory
QXU4111	PDP II	3.5	Compulsory
QXU5111	PDP III	3.5	Compulsory
QXU4000	MS I-Structure and Properties	3.5	Compulsory
QXU4006	MS II-Processing and Applications	3.5	Compulsory

QXU4001	Molecules to Materials	3.5	Compulsory
NXC5010	Functional Materials	3.5	Compulsory
QXU4011	Introduction to Engineering Materials	4.0	Compulsory
QXU4007	Experiments in Materials 1	3.5	Compulsory
QXU5017	Experiments in Materials 2	3.5	Compulsory
NXC4022	Thermodynamics and Phase Transformations	3.5	Compulsory
QXU4002	Chemistry for Materials	4.0	Compulsory
QXU5010	Surfaces and Interfaces	3.5	Compulsory
NXC5015	Structural Characterisation	3.5	Compulsory
NXC5026	Metals I-Deformation and Strengthening	3.5	Compulsory
QXU5030	Composite Materials	3.5	Compulsory
QXU5032	Physical Properties of Polymers	4.0	Compulsory
NXC5036	Metals II-Alloy Systems and Heat Treatment	3.5	Compulsory
QXU6002	Materials Selection in Design	4.0	Compulsory
QXU6007	Environmental Properties of Materials	3.5	Compulsory
QXU6022	Ceramics	4.0	Compulsory
NXC6023	Fatigue and Creep Failure	3.0	Compulsory
NXC6024	Fracture Mechanics	3.0	Compulsory
NXC6025	Manufacturing Processes	4.0	Compulsory
QXU7027	Renewable Energy Materials	3.5	Compulsory

(3) Comprehensive Practice

1.0 credit

Students can participate in a variety forms of scientific research training including innovative research program, academic competition, innovative and business training plan for college students, academic competition, “Peak Experience Plan”, social research, and scientific research project. Students are encouraged to participate in a variety forms of central practice such as overseas practice, international internship, winter and summer camp.

(4) Design/Thesis for Graduation

8.0 Credits

Module Code	Module Name	Credit	Speciality of module
QXU6021	Materials Project	8.0	Compulsory

Based on the graduation design/thesis, the credits of labor education are 32, in order to guide students to develop high quality of labor habits and cultivate labor values in their path of life.

3. Personal Development Modules (6.0 credits, at least 4 modules, students are suggested to choose English taught modules)

- (1) Comprehensive Literary Module
- (2) Discipline Extension Module
- (3) Minor/Double Degree Module
- (4) Advanced Academic Module

Module Code	Module Name	Credit	Speciality of module
NXC1001	The Presentation of the Art of Peking Opera	1.0	Elective
NXC1002	The Copy and Creation of Traditional Chinese Realistic Painting	1.0	Elective
NXC1003	An Introduction to Classical Music of China	1.0	Elective
U01L11001	An Introduction to Aviation	1.0	Elective
U02L11001	An Introduction to Astronautics	1.0	Elective
NXC1004	Fundamentals of Computer	1.0	Elective
NXC1005	Inorganic Chemistry	2.0	Elective
NXC1006	Fundamentals of Organic Chemistry	2.0	Elective
NXC1007	Physical Chemistry	2.0	Elective
NXC1008	History of Western Philosophy	2.0	Elective
NXC1009	3D Print	1.0	Elective
NXC1010	Scientific English Literature Writing	1.5	Elective
NXC1011	Engineering Literacy-Basic Engineering Practice	2.0	Elective
NXC1012	Engineering Literacy—Teaching and Innovative Practice of Intelligent Robot System	2.0	Elective

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It is suggested that students should choose English taught modules, from all four categories above. Each module offered in each semester will be included in the course selection manual.

A. Scientific literacy modules: subjects on natural science such as introduction to aeronautics, astronautics and navigation, environment, biology, etc. Students must take one module among “An Introduction to Aviation”, “An Introduction to Astronautics”, and “An Introduction to Marine Navigation”. Computer fundamentals are a compulsory module.

B. Modules on economics, management and law: including economy, management, legal education, etc.

C. Humanities modules: including philosophy, ethics, history, culture, language, literature, society, aesthetics, life and development, etc.

D. Art literacy modules: students can choose modules form “An Introduction to Art”, “Music Appreciation”, “Art Appreciation”, “Film Appreciation”, “Drama Appreciation”, “Dance Appreciation”, “Calligraphy Appreciation”, and “Chinese Opera Appreciation”, among which “The Presentation of the Art of Peking Opera” is compulsory.

4. Quality Development Module

- (1) Ideological Education Activities
- (2) Public Benefit Activities
- (3) Innovation and Entrepreneurship Activities
- (4) Recreational Activities
- (5) Social Practice Activities
- (6) ...

8. The Support matrix of curriculum system, training objectives and graduation requirements

General Education Modules

Module	Module Name	Training Objective	Graduation Requirement
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Category		1	2	3	1	2	3
Ideological and Political Theory Module	Essentials of Chinese Modern History		✓	✓			✓
	Marxism General Principle		✓	✓			✓
	Ethics and Fundamental of Law		✓	✓			✓
	Introduction to Mao Zedong Thoughts and the Theoretical System of Socialism with Chinese Characteristics		✓	✓			✓
	Situation and Policy		✓	✓			✓
Military Module	Military Theory		✓	✓			✓
	Military Training		✓	✓			✓
Sports and Health Module	Students Mental Health Education		✓	✓			✓
	Physical Quality Development		✓	✓			✓
Aesthetics and Art Module	Aesthetics Education		✓	✓			✓
	Art Limited Elective		✓	✓			✓
Language Module	English		✓	✓	✓		
Mathematics and Natural Science Module	Advanced Math 1	✓	✓	✓	✓		
	Advanced Math 2	✓	✓	✓	✓		
	Linear Algebra	✓	✓	✓	✓		
	Mathematical Modelling and Computing	✓	✓	✓	✓		
	General Physics	✓	✓	✓	✓		

Discipline Modules

Module Category	Module Name	Training Objective			Graduation Requirement		
		1	2	3	1	2	3
Discipline Elementary Module	Engineering Mechanics	✓	✓	✓		✓	✓
	Engineering Design Methods	✓	✓	✓		✓	✓
Discipline	PDP I		✓	✓			✓

Module Category	Module Name	Training Objective			Graduation Requirement		
		1	2	3	1	2	3
Core Module	PDP II		✓	✓			✓
	PDP III		✓	✓			✓
	MS I-Structure and Properties	✓	✓	✓	✓	✓	✓
	MS II-Processing and Applications	✓	✓	✓	✓	✓	✓
	Molecules to Materials	✓	✓	✓	✓	✓	✓
	Functional Materials	✓	✓	✓	✓	✓	✓
	Introduction to Engineering Materials	✓	✓	✓	✓	✓	✓
	Experiments in Materials 1	✓	✓	✓	✓	✓	✓
	Experiments in Materials 2	✓	✓	✓	✓	✓	✓
	Thermodynamics and Phase Transformations	✓	✓	✓	✓	✓	✓
	Chemistry for Materials	✓	✓	✓	✓	✓	✓
	Surfaces and Interfaces	✓	✓	✓	✓	✓	✓
	Structural Characterisation	✓	✓	✓	✓	✓	✓
	Metals I-Deformation and Strengthening	✓	✓	✓	✓	✓	✓
	Composite Materials	✓	✓	✓	✓	✓	✓
	Physical Properties of Polymers	✓	✓	✓	✓	✓	✓
	Metals II-Alloy Systems and Heat Treatment	✓	✓	✓	✓	✓	✓
	Materials Selection in Design	✓	✓	✓	✓	✓	✓
	Environmental Properties of Materials	✓	✓	✓	✓	✓	✓
	Ceramics	✓	✓	✓	✓	✓	✓

Module Category	Module Name	Training Objective			Graduation Requirement		
		1	2	3	1	2	3
	Fatigue and Creep Failure	✓	✓	✓	✓	✓	✓
	Fracture Mechanics	✓	✓	✓	✓	✓	✓
	Manufacturing Processes	✓	✓	✓	✓	✓	✓
	Renewable Energy Materials	✓	✓	✓	✓	✓	✓
Practice and Training	Scientific Research Training		✓	✓		✓	✓
Design/ Thesis for Graduation	Graduation Design of Materials Project		✓	✓		✓	✓

Personal Development Modules

Module Category	Module Name	Training Objective			Graduation Requirement		
		1	2	3	1	2	3
Comprehensive Literacy Module	Each module offered in each semester will be included in the course selection manual.	✓	✓	✓			✓
Discipline Extension Module		✓	✓	✓		✓	✓
Minor/Double Degree Module		✓	✓	✓		✓	✓
Advanced Academic Module		✓	✓	✓		✓	✓

Quality Development Module

Module Category	Module Name	Training Objective			Graduation Requirement		
		1	2	3	1	2	3
Ideological Education Activities	Each module offered in each	✓	✓	✓			✓
Public Benefit Activities		✓	✓	✓			✓

Module Category	Module Name	Training Objective			Graduation Requirement		
		1	2	3	1	2	3
Innovation and Entrepreneurship Activities	semester will be included in the course selection manual.	√	√	√			√
Recreational Activities		√	√	√			√
Social Practice Activities		√	√	√			√
.....		√	√	√			√

9. Instructive Education Plan

The Instructive Education Plan of Materials Science and Engineering for Undergraduates of Grade 2020

Module	Module Category	Module Code	Name of Course	Speciality	Credit	Hour	Note
General Education	Ideological and political theory modules	U44G11001	Chinese Compulsory Modules I Essentials of Chinese Modern History	General education	3.0	48	
		U13G11007	Chinese Compulsory Modules II Marxism General Principle	General education	3.0	48	
		U13G11012	Chinese Compulsory Modules III Ethics and Fundamental of Law	General education	3.0	48	
		U44G11004	Chinese Compulsory Modules IV Fundamental of Mao Ze Dong Thoughts	General education	5.0	80	
		U13G11013	Situation and Policy	General education	2.0	32	

	Military Modules	U34G11005	Military Theory		2.0	32	
		U34P41002	Military Training		2.0	120	
	Mental Growth and Personal Development Modules	U34G11004	Students Mental Health Education		2.0	32	Meet the requirements for passing <i>the National Student Fitness Standards</i> and obtain one fitness level certificate and students should be proficient in 2 sports skills and obtain a skill certificate (one of which is swimming).
		See courses scheduled in the current semester	Specific program courses		1.0	32	
		See courses scheduled in the current semester	Specific program courses		1.0	32	
		See courses scheduled in the current semester	Specific program courses		1.0	32	
		See courses scheduled in the current semester	Specific program courses		1.0	32	
	Art literacy modules	U30L21046	College aesthetic education		2.0	32	They are limited elective courses including “College

							<p>aesthetic education” and art literacy modules, for a total of 4 credits; among them, "College aesthetic education" is a compulsory course (2 credits); all students should take at least 2 credits in the eight art limited elective courses designated by the Ministry of Education.</p>
		U30L11001/ 2/3/4/5/6/7/8	Eight art limited		2.0	32	

			elective courses designated by the Ministry of Education.				
	Language Module	QXU3101	English Language I		3.5	56	
		QXU3102	English Language II		5.5	88	
	Mathematics and Natural Science Module	NXC3000	Advanced Maths I		5.5	88	
		NXC3004	Advanced Maths II		5.5	88	
		NXC3001	General Physics		5.0	82	
		NXC3002	Linear Algebra		3.0	48	
		NXC3005	Mathematical Modelling and Computing		4.0	64	
Total credits		1146/62					
Discipline	Discipline elementary modules	NXC4012	Mechanical Modelling		3.5	56	
		NXC4008	Engineering Design Methods		3.5	56	
	Discipline core modules	QXU3111	PDP I		3.5	56	
		QXU4111	PDP II		3.5	56	
		QXU5111	PDP III		3.5	56	
		QXU4000	MS I Structure and Properties		3.5	56	
		QXU4006	MS II Processing and Applications		3.5	56	
		QXU4001	Molecules to Materials		3.5	56	
		NXC5010	Functional Materials		3.5	56	
		QXU4011	Introduction to Engineering Materials		4.0	64	
		QXU4007	Experiments in Materials 1		3.5	56	
		QXU5017	Experiments in Materials 2		3.5	56	
		NXC4022	Thermodynamics and		3.5	56	

			Phase Transformations					
		QXU4002	Chemistry for Materials		4.0	64		
		QXU5010	Surfaces and Interfaces		3.5	56		
		NXC5015	Structural Characterisation		3.5	56		
		NXC5026	Metals I Deformation and Strengthening		3.5	56		
		QXU5030	Physical Properties of Polymers		3.5	56		
		QXU5032	Metals II Alloy Systems and Heat Treatment		4.0	64		
		NXC5036	Materials Selection in Design		3.5	56		
		QXU6002	Environmental Properties of Materials		4.0	64		
		QXU6007	Ceramics		3.5	56		
		QXU6022	Fatigue and Creep Failure		4.0	64		
		NXC6023	Fracture Mechanics		3.0	48		
		NXC6024	Manufacturing Processes		3.0	48		
		NXC6025	Physical Properties of Polymers		4.0	64		
		QXU7027	Renewable Energy Materials		3.5	56		
		Comprehensive practice (includes innovation and entrepreneurship practice)		Scientific Research		1.0		16
		Graduation Design/Thesis	QXU6021	Material Project		8.0		128
	Total credits		1688/105.5					
Comprehensive literacy		NXC1001	The Presentation of the Art of Peking	NPU and QMES elective courses are available for students, including comprehensive				

(elective courses)			Opera	development courses. Each semester courses can be checked on course-election handbook.
		NXC1002	The Copy and Creation of Traditional Chinese Realistic Painting	
		NXC1003	An Introduction to Classical Music of China	
		U01L1100 1	An Introduction to Aviation	
		U02L1100 1	An Introduction to Astronautics	
		U03L1100 1	An Introduction to Marine Navigation	
		NXC1004	Fundamentals of Computer	
		NXC1005	Inorganic Chemistry	
		NXC1006	Fundamentals of Organic Chemistry	
		NXC1007	Physical Chemistry	
		NXC1008	History of Western Philosophy	
		NXC1009	3D Print	
		
Total credits		96/6.0		
Total hours/credits: 2930/173.5				
Reference: Code QX courses are taught by QMUL. Code NX courses are taught by NPU. Code U courses are Chinese Compulsory Courses, Mental Health, Military Theory courses from MoE, as well as some elective courses.				

NPU Education Plan for Undergraduates

(QMUL Engineering School)

Name of Major Polymer Materials and Engineering

Chief Professor (Head of Teaching) sign _____

Y M D

From Teaching Affairs Department of Northwestern Polytechnical University

Polymer Materials and Engineering

Education Plan for 2020 Undergraduates

(QMUL Engineering School)

1. Major Introduction

Polymer materials are at the cutting-edge inter-discipline of materials science and soft materials. It builds the development foundation of many scientific research and industries, such as aviation, new energy, sustainable development, bio-science, health and medicine, information technology, and intelligent manufacturing. As a popular plan for undergraduates, Polymer Materials and Engineering in Queen Mary University of London (hereinafter as QMUL) covers metals, ceramics, polymers, and composite with the involvement of chemistry, materials and engineering. It is one of the most influential and distinct plans in QMUL, covering polymers, composites, metals and ceramics. We provide elite education and professional training for students with a thorough grounding in the structure of materials, the properties of materials, the performance of materials, the manufacturing processes and design, shaping and applications. It has been rated as 5-star plan by the British government for many times. A survey conducted by the National Union of Students in 2011 showed that it ranked top 1 in the UK. The Material plans in Northwestern Polytechnical University (hereinafter as NPU) enjoy a high reputation and a great popularity internationally. Material discipline of NPU is the National Key Discipline and ranked top 3 among all National Key Disciplines in the 2012 Discipline Evaluation in China. Polymer Materials and Engineering is a famous brand and characteristic major in Shaanxi Province.

In order to learn from the advanced concept and model of training innovative undergraduate talents in British higher education and provide Chinese students with an authentic British-style higher education in their homeland, NPU and QMUL have launched a joint educational institution named Queen Mary University of London Engineering School,

Northwestern Polytechnical University (hereinafter referred to as JEI), which was approved by the Ministry of Education of China. The JEI, which builds on the acknowledged expertise and experience of the two universities and their complementary research strengths in materials science, engineering, chemical and fully uses educational resource advantages and high-level international cooperation platforms of both universities to provide a high quality degree level education in the plan of Polymer Materials and Engineering (080407H). We draw on the academic expertise of both institutions and adopt an international teaching mode with curriculum system, teaching materials, and assessment methods from the UK. We aims to develop qualified and innovative talents who can study and work transnationally with the knowledge of natural science, polymer materials science and engineering, and social science. Students graduate with comprehensive qualities, high professional competencies, a global horizon, a life-long study ability, and recognition of international rules.

2. Education Objectives

Education Goal: Develop qualified and innovative talents who can study and work transnationally with the knowledge of natural science, polymer materials science and engineering, and social science. Students graduate with comprehensive qualities, high professional competencies, a global horizon, a life-long study ability, and the recognition of international rules. Students who have completed their studies are able to pursue higher degrees and research within universities in China and internationally or careers in the expanding materials science and manufacturing industry in world famous enterprises.

(1) Be equipped with solid basic knowledge and professional skills

Students should master basic knowledge of shaping, characterisation, forming, product design and applications in polymer materials, and professional knowledge of the structure and properties of polymer materials, chemical and physical structure characterisation of polymer materials, and evaluation of materials properties. Being equipped with problem-solving abilities, Students are able to conduct research and engineering practice with their basic knowledge and professional skills in the field of polymer materials.

(2) Be equipped with international competitiveness

Students become highly proficient in English language: reading English materials and books in polymer materials, writing academic essays in English, and conducting technical presentations in English. The plan develops students' global horizon and the recognition of international rules via the British teaching mode and overseas internship plans. Students can obtain, use and manage various information to conduct cross-cultural communication and cooperation with innovative abilities and international competitiveness. Students can recognize Chinese characteristics and international comparisons correctly, as well as comprehend modern China and the world objectively and comprehensively.

(3) Be equipped with the ability of life-long study

Students should promote and practice Socialist Core Values, recognize the responsibility of times and mission of history, and to understand ambition and dedication correctly. Students should have a strong sense of social responsibility, a healthy mental and moral state, the ability of leading and working in teams, and outstanding communicative and practical skills. Equipped with good presentation skills and writing abilities, students can communicate effectively with their peers and the public against complex engineering and scientific problems. The cultivation of consciousness of engineering ethics, and the concept of working for the wellbeing of the human beings and sustainable development can help students to adapt to dynamic changes, and master the cutting-edge knowledge and new trend in the field of polymer materials so as to constantly improve students' abilities.

3. Ideological education

Implement the fundamental task of establishing virtues and educating people, use the thought of socialism with Chinese characteristics in the new era to shape the soul and educate people, and strive to cultivate students' national sentiments. Make full use of the wide application of materials science and engineering, strong practical characteristics. Combine the course knowledge and national major projects, as well as personal stories, through class and extracurricular as well as new media multidimensional carrier and other diversified teaching methods to strengthen value leadership. Hold the ideological and political work through the whole process of education and teaching. It is not only necessary to make the process of

knowledge transfer vivid, but also to make the process of ideological and political moral education as a common touch, so as to convince people with reason and convince people with facts, and to guide students to establish socialist core values and patriotism while cultivating solid professional knowledge, constantly improve students' ideological and moral sentiments, and enhance their sense of social responsibility and mission to serve the country and the people.

4. Graduation Requirements (Core Abilities of Students)

(1) Master basic knowledge

Students should master: extensive knowledge in the field of materials science including materials science, the structure of materials, the properties of materials, the performance of materials, the manufacturing processes and design, and application and development; intensive professional knowledge, including polymer chemistry, functional polymer, high-property polymer, and resin matrix polymer; experimental and computational methods in the field of polymer materials science and engineering.

(2) Develop professional skills

Students should be equipped with creative problem-solving and transferable skills and recognize the important value of materials science to engineering and other technologies. On the premise of safety, students conduct various experiments practically and are able to design, conduct, analyse and evaluate experiments and the results. Students are familiar with chemistry, material experiments, and analysing equipment, and are capable of searching, collecting and selecting data and presenting scientific and technical report. At last, students should have related abilities to conduct scientific research and develop technology and products in the field of polymer materials.

(3) Develop comprehensive qualities

Students should have the abilities of international competitiveness, communication, life-long study, independent study and work, and leading and working in teams. Students can estimate the relevance, importance and reliability of various information and realize the

influence of science and engineering on the future of the society worldwide. Students are capable of communicating and cooperating transnationally with innovative ability and international competitiveness. With the concept of sustainable development in mind, students are exposed to cutting-edge technology changes in the field of materials and can improve themselves constantly in practice.

5. Qualification and Degree Certificate

Official length of the plan: 4+0 years' study in accordance with the credit management system.

Qualification and certificate: After students have successfully passed all courses, they will be awarded diploma by NPU, BEng degree by NPU, and BEng degree by QMUL.

6. Credits and Hours

Total credits: 167.5+X credits

Includes:

Type of module	Credit
General education module	62
discipline module	105.5
Total credits	167.5
Comprehensive literacy module	X
comprehensive practices	

7. Curriculum System and Credits

(General education module and discipline module: 167.5 credits; Comprehensive literacy module and comprehensive practices module: X credits)

1. General education modules 62.0 credits

(1) Ideological and political theory modules 16.0 credits

Module Code	Module Name	Credit	Module Speciality
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U44G11001	Chinese compulsory courses I-Essentials of Chinese Modern History	3.0	Compulsory
U13G11007	Chinese compulsory courses II-Marxism General Principle	3.0	Compulsory
U13G11012	Chinese compulsory courses III-Ethics and Fundamental of Law	3.0	Compulsory
U44G11004	Chinese compulsory courses IV-Fundamental of Mao Ze Dong Thoughts	5.0	Compulsory
U13G11013	Situation and Policy	2.0	Compulsory

(2) Military modules 4.0 credits

Module Code	Module Name	Credit	Module Speciality
U34G11005	Military Theory	2.0	Compulsory
U34P41002	Military Training	2.0	Compulsory

(3) Mental growth and personal development modules 6.0 credits

Module Code	Module Name	Credit	Module Speciality
U34G11004	Students Mental Health Education	2.0	Compulsory
	For specific program courses, see the current semester courses offered by the Physical Education Department	4.0	Optional
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Physical Education is compulsory module in the first to the fourth semester. Students can freely choose different module according to their majors, physical conditions, interesting and physical basis during sophomore year. Must meet the 421X standard of school physical education qualification upon graduation, that is, complete 4 credits; students should be proficient in 2 sports skills and obtain a skill certificate (one of which is swimming); Meet the requirements for passing *the National Student Fitness Standards* and obtain one fitness level

certificate; During the undergraduate period, students can study physical quality development module according to their personal interests and obtain X credits.

(4) Art literacy modules

4.0 credits

Module code	Module name	Credit	Module Speciality
U30L21046	College aesthetic education	2.0	Compulsory
U30L11001	An Introduction to Art	2.0	Optional
U30L11002	Appreciation of classical music	2.0	Optional
U30L11003	Appreciation Of Chinese and Europe Arts	2.0	Optional
U30L11004	Film and Television Appreciation	2.0	Optional
U30L11005	Calligraphy appreciation	2.0	Optional
U30L11006	Appreciation of Drama	2.0	Optional
U30L11007	Appreciation of Traditional Chinese Opera	2.0	Optional
U30L11008	Appreciation of Dance	2.0	Optional

They are limited elective courses including “College aesthetic education” and art literacy modules, for a total of 4 credits; among them, "College aesthetic education" is a compulsory course (2 credits); all students should take at least 2 credits in the eight art limited elective courses designated by the Ministry of Education.

(5) Language modules

9.0 credits (no less than 4 credits of Public English courses (except English Major & German Major))

Module code	Module name	Credit	Module Speciality
QXU3101	English Language I	3.5	Compulsory

QXU3102	English Language II	5.5	Compulsory
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(6) Mathematics and Natural Science

23.0 Credits

Module Code	Module Name	Credit	Module Speciality
NXC3000	Advanced Math 1	5.5	Compulsory
NXC3004	Advanced Math 2	5.5	Compulsory
NXC3002	Linear Algebra	3.0	Compulsory
NXC3005	Mathematical Modelling and Computing	4.0	Compulsory
NXC3001	General Physics	5.0	Compulsory

2. Discipline Modules

105.5 Credits

(1) Discipline Elementary Modules

7.0 Credits

Module Code	Module Name	Credit	Module Speciality
NXC4012	Mechanical Modelling	3.5	Compulsory
NXC4008	Engineering Design Methods	3.5	Compulsory

(2) Discipline Core Modules

89.5 Credits

Module Code	Module Name	Credit	Module Speciality
QXU3111	PDP 1	3.5	Compulsory
QXU4111	PDP 2	3.5	Compulsory
QXU5111	PDP 3	3.5	Compulsory
NXC4122	Thermodynamics and Fluid Mechanics	3.5	Compulsory
QXU4000	MS 1 Structure and Properties	3.5	Compulsory
QXU4001	Molecules to Materials	3.5	Compulsory

QXU4006	MS 2 Processing and Application	3.5	Compulsory
NXC5010	Functional Materials	3.5	Compulsory
QXU4011	Introduction to Engineering Materials	4.0	Compulsory
QXU4007	Experiments in Materials 1	3.5	Compulsory
QXU5017	Experiments in Materials 2	3.5	Compulsory
QXU5010	Surfaces and Interfaces	3.5	Compulsory
QXU4003	Polymer Chemistry	4.0	Compulsory
QXU5032	Physical Properties of Polymers	4.0	Compulsory
NXC5013	Polymer Characterization	3.5	Compulsory
NXC5014	Elastomer Materials	3.5	Compulsory
NXC5028	Polymer Degradation	3.5	Compulsory
QXU5030	Composite Materials	3.5	Compulsory
QXU6002	Materials Selection in Design	4.0	Compulsory
QXU6007	Environmental Properties of Materials	3.5	Compulsory
NXC6018	Polymer Processing	4.0	Compulsory
NXC6019	Failure of Polymers	3.0	Compulsory
NXC6020	Polymer Product Design	3.0	Compulsory
QXU6034	Functional Polymers	3.5	Compulsory
QXU7033	Advanced Polymer Synthesis	4.0	Compulsory

(3) Comprehensive Practice

1.0 Credit

Students can participate in a variety forms of scientific research training including innovative research program, academic competition, innovative and business training plan for college students, academic competition, “Peak Experience Plan”, social research, and scientific research project. Students are encouraged to participate in a variety forms of central practice such as overseas practice, international internship, winter and summer camp.

(4) Design/Thesis for Graduation

8.0 Credits

Module Code	Module Name	Credit	Module Speciality
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QXU6035	Polymer Project	8.0	Compulsory
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Based on the graduation design/thesis, the credits of labor education are 32, in order to guide students to develop high quality of labor habits and cultivate labor values in their path of life.

3. Personal Development Modules (6.0 credits, at least 4 modules, students are suggested to choose English taught modules)

- (1) Comprehensive Literary Module
- (2) Discipline Extension Module
- (3) Minor/Double Degree Module
- (4) Advanced Academic Module

Module Code	Module Name	Credit	Module Nature
NXC1001	The Presentation of the Art of Peking Opera	1.0	Optional
NXC1002	The Copy and Creation of Traditional Chinese Realistic Painting	1.0	Optional
NXC1003	An Introduction to Classical Music of China	1.0	Optional
U01L11001	An Introduction to Aviation	1.0	Optional
U02L11001	An Introduction to Astronautics	1.0	Optional
NXC1004	Fundamentals of Computer	1.0	Optional
NXC1005	Inorganic Chemistry	2.0	Optional
NXC1006	Fundamentals of Organic Chemistry	2.0	Optional
NXC1007	Physical Chemistry	2.0	Optional
NXC1008	History of Western Philosophy	2.0	Optional
NXC1009	3D Print	1.0	Optional
NXC1010	Scientific English Literature Writing	1.5	Optional

NXC1011	Engineering Literacy-Basic Engineering Practice	2.0	Optional
NXC1012	Engineering Literacy—Teaching and Innovative Practice of Intelligent Robot System	2.0	Optional
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It is suggested that students should choose English taught modules, from all four categories above. Each module offered in each semester will be included in the course selection manual.

A. Scientific Literacy Modules: subjects on natural science such as introduction to aviation, astronautics and marine navigation, environment, biology, etc. Students must take one module among “An Introduction to Aviation”, “An Introduction to Astronautics”, and “An Introduction to Marine Navigation”. Fundamentals of Computer is a compulsory module.

B. Modules on Economics, Management and Law: including economy, management, legal education, etc.

C. Humanities Modules: including philosophy, ethics, history, culture, language, literature, society, aesthetics, life and development, etc.

D. Art Literacy Modules: students can choose modules form “An Introduction to Art”, “Music Appreciation”, “Art Appreciation”, “Film Appreciation”, “Drama Appreciation”, “Dance Appreciation”, “Calligraphy Appreciation”, and “Chinese Opera Appreciation”, among which “The Presentation of the Art of Peking Opera” is compulsory.

4. Quality Development Module

- (1) Ideological Education Activities
- (2) Public Benefit Activities
- (3) Innovation and Entrepreneurship Activities
- (4) Recreational Activities
- (5) Social Practice Activities
- (6) ...

8. The Support matrix of curriculum system, training objectives and graduation requirements

General Education Modules

Module Category	Module Name	Training Objective			Graduation Requirement		
		1	2	3	1	2	3
Ideological and Political Theory Module	Essentials of Chinese Modern History		√	√			√
	Marxism General Principle		√	√			√
	Ethics and Fundamental of Law		√	√			√
	Introduction to Mao Zedong Thoughts and the Theoretical System of Socialism with Chinese Characteristics		√	√			√
	Situation and Policy		√	√			√
Military Module	Military Theory		√	√			√
	Military Training		√	√			√
Sports and Health Module	Students Mental Health Education		√	√			√
	Physical Quality Development		√	√			√
Aesthetics and Art Module	Aesthetics Education		√	√			√
	Art Limited Elective		√	√			√
Language Module	English		√	√	√		
Mathematics and Natural Science Module	Advanced Math 1	√	√	√	√		
	Advanced Math 2	√	√	√	√		
	Linear Algebra	√	√	√	√		
	Mathematical Modelling and Computing	√	√	√	√		
	General Physics	√	√	√	√		

Discipline Modules

Module Category	Module Name	Training Objective			Graduation Requirement		
		1	2	3	1	2	3
Discipline Elementary Module	Engineering Mechanics	✓	✓	✓		✓	✓
	Engineering Design Methods	✓	✓	✓		✓	✓
Discipline Core Module	PDP 1		✓	✓			✓
	PDP 2		✓	✓			✓
	PDP 3		✓	✓			✓
	Thermodynamics and Fluid Mechanics	✓	✓	✓	✓	✓	✓
	MS 1-Structure and Properties	✓	✓	✓	✓	✓	✓
	Molecules to Materials	✓	✓	✓	✓	✓	✓
	MS 2-Processing and Applications	✓	✓	✓	✓	✓	✓
	Functional Materials	✓	✓	✓	✓	✓	✓
	Introduction to Engineering Materials	✓	✓	✓	✓	✓	✓
	Experiments in Materials 1	✓	✓	✓	✓	✓	✓
	Experiments in Materials 2	✓	✓	✓	✓	✓	✓
	Surfaces and Interfaces	✓	✓	✓	✓	✓	✓
	Polymer Chemistry	✓	✓	✓	✓	✓	✓
	Physical Properties of Polymers	✓	✓	✓	✓	✓	✓
	Polymer Characterization	✓	✓	✓	✓	✓	✓
	Elastomer Materials	✓	✓	✓	✓	✓	✓
	Polymer Degradation	✓	✓	✓	✓	✓	✓
	Composite Materials	✓	✓	✓	✓	✓	✓
	Materials Selection in Design	✓	✓	✓	✓	✓	✓
	Environmental Properties of Materials	✓	✓	✓	✓	✓	✓
	Polymer Processing	✓	✓	✓	✓	✓	✓
	Failure of Polymers	✓	✓	✓	✓	✓	✓
	Polymer Product Design	✓	✓	✓	✓	✓	✓
	Functional Polymers	✓	✓	✓	✓	✓	✓
	Advanced Polymer Synthesis	✓	✓	✓	✓	✓	✓

Module Category	Module Name	Training Objective			Graduation Requirement		
		1	2	3	1	2	3
Practice and Training	Scientific Research Training		√	√		√	√
Design/ Thesis for Graduation	Graduation Design of Polymer Major		√	√		√	√

Personal Development Modules

Module Category	Module Name	Training Objective			Graduation Requirement		
		1	2	3	1	2	3
Comprehensive Literacy Module	Each module offered in each semester will be included in the course selection manual.	√	√	√			√
Discipline Extension Module		√	√	√		√	√
Minor/Double Degree Module		√	√	√		√	√
Advanced Academic Module		√	√	√		√	√

Quality Development Module

Module Category	Module Name	Training Objective			Graduation Requirement		
		1	2	...	1	2	...
Ideological Education Activities	Each module offered in each semester will be included in the course selection manual.	√	√	√			√
Public Benefit Activities		√	√	√			√
Innovation and Entrepreneurship Activities		√	√	√			√
Recreational Activities		√	√	√			√
Social Practice Activities		√	√	√			√
.....		√	√	√			√

9. Instructive Education Plan

**The Instructive Education Plan of Polymer Materials and Engineering for
Undergraduates of Grade 2020**

Module	Category	Code	Name	Speciality	Credit	Hour	Note
General Education	Ideological and Political Theory Module	U44G1100 1	Chinese Compulsory Modules 1- Essentials of Chinese Modern History	General Education	3.0	48	
		U13G1100 7	Chinese Compulsory Modules 2- Marxism General Principle	General Education	3.0	48	
		U13G1101 2	Chinese Compulsory Modules 3- Ethics and Fundamental of Law	General Education	3.0	48	
		U44G1100 4	Chinese Compulsory Modules 4-Introduction to Mao Zedong Thoughts and the Theoretical System of Socialism with Chinese Characteristics	General Education	5.0	80	
		U13G1101 3	Situation and Policy	General Education	2.0	32	
	Military Module	U34G1100 5	Military Theory		2.0	32	
		U34P41002	Military Theory		2.0	120	
	Sports and Health Module	U34G1100 4	Students Mental Health Education		2.0	32	Students must meet the 421X standard of school physical education qualification
		See courses offered in the current semester.	Physical Education		1.0	32	
		See courses offered in the current semester.	Physical Education		1.0	32	

Module	Category	Code	Name	Speciality	Credit	Hour	Note
		See courses offered in the current semester.	Physical Education		1.0	32	upon graduation, and they should be proficient in 2 sports skills and obtain a skill certificate (one of which is swimming).
		See courses offered in the current semester.	Physical Education		1.0	32	
	Aesthetics and Art Module	U30L21046	Aesthetics Education		2.0	32	Limited Elective Modules, including Aesthetics Education and Art modules, 4 credits in total. Aesthetics Education is a compulsory module, 2 credits. All students should take at least 2 credits in the 8 art limited elective modules designated by the Ministry of Education.
		U30L11001/2/3/4/5/6/7/8	Eight Art Limited Elective Modules Designated by the Ministry of Education		2.0	32	

Module	Category	Code	Name	Speciality	Credit	Hour	Note
	Language Module	QXU3101	English 1		3.5	56	
		QXU3102	English 2		5.5	88	
	Mathematics and Natural Science Module	NXC3000	Advanced Math 1		5.5	88	
		NXC3004	Advanced Math 2		5.5	88	
		NXC3001	General Physics		5.0	82	
		NXC3002	Linear Algebra		3.0	48	
		NXC3005	Mathematical Modelling and Computing		4.0	64	
Total Credits		1162/62					
Discipline Core Module	Discipline Elementary Module (including relevant experimental and practice modules)	NXC4012	Mechanical Modelling		3.5	56	
		NXC4008	Engineering Design Methods		3.5	56	
	Discipline Core Module (including relevant experimental and practice modules, and comprehensive design modules)	NXC4008	Engineering Design Methods		3.5	56	
		NXC4012	Mechanical Modelling		3.5	56	
		QXU3111	PDP 1		3.5	56	
		QXU4111	PDP 2		3.5	56	
		QXU5111	PDP 3		3.5	56	
		NXC4122	Thermodynamics and Fluid Mechanics		3.5	56	
		QXU4000	MS 1-Structure and Properties		3.5	56	
		QXU4001	Molecules to Materials		4.0	64	
		QXU4006	MS 2-Processing and Applications		3.5	56	
		NXC5010	Functional Materials		3.5	56	
		QXU4011	Introduction to Engineering Materials		3.5	56	
		QXU5010	Surfaces and Interfaces		4.0	64	
QXU4003	Polymer Chemistry		3.5	56			
QXU5032	Physical Properties of Polymers		3.5	56			

Module	Category	Code	Name	Speciality	Credit	Hour	Note
		NXC5013	Polymer Characterization		3.5	56	
		NXC5014	Elastomer Materials		3.5	56	
		NXC5028	Polymer Degradation		4.0	64	
		QXU5030	Composite Materials		3.5	56	
		QXU6002	Materials Selection in Design		4.0	64	
		QXU6007	Environmental Properties of Materials		3.5	56	
		NXC6018	Polymer Processing		4.0	64	
		NXC6019	Failure of Polymers		3.0	48	
		NXC6020	Polymer Product Design		3.0	48	
		QXU6034	Functional Polymers		4.0	64	
		QXU7033	Advanced Polymer Synthesis		3.5	56	
	Practice and Training (including practice of innovation and entrepreneurship)		Scientific Research Training		1.0	16	
	Design/Thesis for Graduation	QXU6021	Graduation Design of Materials Science and Engineering		8.0	128	
Total Credits		1688/105.5					
Personal Development Module (Elective Modules)		NXC1001	The Presentation of the Art of Peking Opera	NPU and QMES elective courses are available for students, including comprehensive development courses. Each semester courses can be checked on course-election handbook.			
		NXC1002	The Copy and Creation of Traditional Chinese Realistic Painting				
		NXC1003	An Introduction to Classical Music of China				
		U01L11001	An Introduction to Aviation				
		U02L11001	An Introduction to Astronautics				
		U03L11001	An Introduction to Marine Navigation				
		NXC1004	Fundamentals of Computer				

Module	Category	Code	Name	Speciality	Credit	Hour	Note
		NXC1005	Inorganic Chemistry				
		NXC1006	Fundamentals of Organic Chemistry				
		NXC1007	Physical Chemistry				
		NXC1008	History of Western Philosophy				
		NXC1009	3D Print				
					
Total Credits		96/6.0					
Total hours / total credits: 2930/173.5							
Reference: Code QX courses are taught by QMUL. Code NX courses are taught by NPU. Code U courses are Chinese Compulsory courses, Military Theory courses from MOE, and some elective courses.							