**应用物理学严济慈英才班（本硕、本博连读）**

**“Yan Jici” Class of Applied Physics（Innovation Class）**

**专业代码：070202**

**学制：4年（本科）**

**培养目标：**

培养家国情怀和全球视野兼备、“三力”（学习力、思想力、行动力）卓越、德智体美劳全面发展的“三创型”（创新、创造、创业）人才。培养具有深厚的数理基础、了解学科前沿；具有较好的科学素养及较强的科研创新意识和能力；具有竞争和团队精神，科研思想活跃、国际视野开阔、具有逐步跻身国际一流科学家队伍潜力的复合型、创新型、学术型高级人才。

**毕业要求：**

**№1.基础知识：**能够将数学、自然科学、物理基础和专业知识用于解决应用物理的复杂问题。

№1.1 具备解决应用物理复杂问题所需的数学、自然科学、物理基础和专业知识。

№1.2 能将数学、自然科学、物理基础的语言工具用于应用物理复杂问题的表述，能够针对应用物理复杂问题中的具体对象建立数学模型并求解。

№1.3 能够将相关知识和数学模型用于推演、分析应用物理复杂问题。

№1.4 能够将相关知识和数学模型方法用于应用物理复杂问题解决方案的比较与综合。

**№2.问题分析：**能够应用数学、自然科学和物理专业知识的基本原理，识别、表达、并通过文献研究分析应用物理复杂问题，以获得有效结论。

№2.1 能基于相关科学原理和数学模型方法正确表达应用物理的复杂问题。

№2.2 针对应用物理的复杂问题，能结合基本原理和文献研究进行分析论证，提出可能的解决方案，并认识到解决方案的多样性。

№2.3能运用专业基本原理，借助文献研究，分析应用物理中的影响因素，并获得有效结论。

**№3.研究：**能够基于科学原理并采用科学方法对应用物理复杂问题进行研究，包括设计实验、分析与解释数据、并通过信息综合得到合理有效的结论。

№3.1 针对应用物理的复杂问题，能基于自然科学和专业基本原理，通过文献研究和相关方法，调研和分析复杂问题的解决方案。

№3.2针对应用物理的复杂问题，能根据要求选择研究路线，设计使用方案。

№3.3针对应用物理的复杂问题，能够根据实验方案构建实验系统，安全地开展实验，正确地采集实验数据。

№3.4 能对实验结果进行分析和解释，并通过信息综合得到合理有效的结论。

**№4.使用现代工具：**能够针对应用物理的复杂问题，开发、选择与使用恰当的技术、资源、现代工程工具和信息技术工具，包括对复杂科学或工程问题的预测与模拟，并能够理解其局限性。

№4.1 了解应用物理专业常用的现代仪器、信息技术工具、工程工具和模拟软件的使用原理和方法，并理解其局限性。

№4.2 能够选择与使用恰当的仪器、信息资源、工程工具和专业模拟软件，对应用物理复杂问题进行分析、计算与设计。

№4.3 能够针对应用物理的具体对象，开发或选用满足特定需求的现代工具，模拟和预测专业问题，能够分析其局限性。

**№5.科学与社会：**能够基于科学相关背景知识进行合理分析，评价应用物理复杂科学和工程问题解决方案对社会、健康、安全、法律以及文化的影响，并理解应承担的责任。

№5.1 充分认识应用物理学科在技术进步和社会发展中的重要地位和作用，了解应用物理相关领域的技术标准体系、知识产权、产业政策和法律法规，理解不同社会文化对科学活动的影响。

№5.2 通过应用物理学科的实验、实践和实习等，能分析和评价科学对社会、健康、安全、法律及文化的影响，以及这些制约因素对项目实施的影响，并理解和明确应承担的责任和义务。

**№6.环境和可持续发展：**能够理解和评价针对应用物理复杂问题的专业科学实践对环境、社会可持续发展的影响。

№6.1 知晓和理解环境保护和可持续发展的理念和内涵。

№6.2 能充分认识应用物理学科实践过程中可能对人类和环境造成的损害和隐患，在制定复杂问题解决方案时能充分考虑并评价环境影响因素，能站在环境保护和可持续发展的角度进行自我约束。

**№7.职业规范：**具有人文社会科学素养、社会责任感，能够在应用物理实践中理解并遵守科学职业道德和规范，履行责任。

№7.1 具有人文社会科学素养、坚定的社会主义信念和社会责任感，有正确的价值观，理解个人与社会的关系，了解中国国情。

№7.2 理解诚实公正、诚信守则的科学职业道德和规范，并能在科学实践中自觉遵守。

№7.3 理解科学家对公众的安全、健康和福祉以及环境保护的社会责任，能对应用物理专业领域实践活动的社会责任进行判断和评鉴，并自觉履行责任。

**№8.个人和团队：**能够在应用物理及其交叉学科背景下的团队中承担个体、团队成员以及负责人的角色。

№8.1 具有团队意识，能在交叉学科背景下与其他成员有效沟通，合作共事。

№8.2 能正确对待作为个体、团队成员和负责人的角色，既能够在团队中独立或合作开展工作，有能够组织、协调和指挥团队开展工作。

**№9.沟通：**能够就应用物理复杂科学和工程问题与业界同行及社会公众进行有效沟通和交流，包括撰写报告和设计文稿、陈述发言、清晰表达或回应指令，并具备一定的国际视野，能够在跨文化背景下进行沟通和交流。

№9.1 能就应用物理专业问题，以口头、文稿、图表等方式，准确表达自己的观点，回应质疑，理解与业界同行和社会公众交流的差异性。

№9.2 了解应用物理专业领域的国际发展趋势、研究热点，理解和尊重世界不同文化的差异性和多样性。

№9.3 具备跨文化交流的语言和书面表达能力，能就应用物理专业问题，在跨文化背景下进行基本沟通和交流。

**№10.终身学习：**具有自主学习和终身学习的意识，有不断学习和适应发展的能力。

№10.1 具有良好的身体素质和心理素质，正确的世界观、价值观和人生观，认同终身教育和持续教育理念，能在社会发展的大背景下，认识到自主学习和终身学习必要业性。

№10.2 具有自主学习的能力，自觉学习外语， 能利用计算机、搜索引擎等现代信息技术跟踪并获取信息，具有适应应用物理专业领域新技术发展的能力，包括对新技术的理解能力、归纳总结能力和提出问题的能力。

**专业简介：**

华南理工大学应用物理学本科专业开办于1986年，1996年更名为应用物理（光电信息与应用），2003年经过学校批准恢复应用物理学专业招生。2017年设应用物理学严济慈英才班。

本专业教师具有良好的师德师风，专业背景与科研方向涵盖物理学一级学科的凝聚态物理、理论物理、声学等三个方向，同时在物理电子学、材料物理与化学等方向布局。研究领域顺应物理学科的发展，具有特色鲜明、拓展性强等特点。

本专业现有1个本科专业实验室，实验室面积超过300平方，仪器设备总价值超过400万元。同时，应用物理学专业还包括声子晶体、高压物理和凝聚态物理实验平台等三个相关科研实验平台。并有中国科学院物理所和中国散裂中子源中心（东莞）等合作培养单位的师资和科研设备支持。

**专业特色：**

应用物理学严济慈英才班与中国科学院物理所和中国中子科学中心（东莞）等联合培养，探索一条培养科研思想活跃、国际视野开阔、具有逐步跻身国际一流科学家队伍潜力的科研骨干和领军学者的成长道路。

**授予学位：**

理学学士学位

**核心课程：**

数学物理方法、力学、热学、电磁学、光学、原子物理学、理论力学、电动力学、热力学与统计物理、量子力学、固体物理、物理学中的数值方法、计算物理方法与实践。

**特色课程：**

新生研讨课：物理学的进化、宇宙的演化

专题研讨课：新产业前沿及其物理基础

双语/全英课程：力学、热学、电磁学、光学、数学物理方法、量子力学、固体物理、物理学中的数值方法、计算物理方法与实践、材料物理

MOOC：物理学中的数值方法、计算物理方法与实践

学科前沿课：新产业前沿及其物理基础

跨学科课程：大学化学、大学化学实验

本研共享课：固体理论II、高等量子力学、物理学进展、声学进展、凝聚态物理实验方法

校企合作课：毕业实习

创新实践课：研究与探索实践（满足“三个一”要求）

专题设计课：计算物理课程设计、固体物理课程设计

劳动教育课程：毕业实习

**一、各类课程学分登记表**

**1.学分统计表**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 课程类别 | 课程要求 | 学分 | 学时 | 备注 |
| 公共基础课 | 必修 | 64 | 1268 |  |
| 通识 | 10 | 160 |  |
| 专业基础课 | 必修 | 49.5 | 880 |  |
| 选修课 | 选修 | 18 | 288 |  |
| 合计 | | 141.5 | 2596 |  |
| 集中实践教学环节（周） |  | 30 | 35周 |  |
| 毕业学分要求 | 171.5 | | | |

备注：毕业学分要求格式：合计学分+集中实践教学环节学分=毕业学分要求

**2.类别统计表**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 学时 | | | | | 学分 | | | | | | |
| 总学时数 | 其中 | | 其中 | | 总学分数 | 其中 | | 其中 | | | 其中 |
| 必修学时 | 选修学时 | 理论教学学时 | 实验教学学时 | 必修学分 | 选修学分 | 集中实践教学环节学分 | 理论教学学分 | 实验教学学分 | 创新创业教育学分 |
| 2596 | 2148 | 448 | 2066 | 530 | 171.5 | 153.5 | 18 | 30 | 123 | 18.5 | 6 |

注：

1.通识课计入选修一项中；

2.实验教学包括“专业教学计划表”中的实验、实习和其他；

3.创新创业教育学分：培养计划中的课程，由各学院教学指导委员会认定，包括竞教结合课程、创新实践课程、创业教育课程等学分；

4.必修学时＋选修学时=总学时数；理论教学学时＋实验教学学时=总学时数；必修学分＋选修学分=总学分数；集中实践教学环节学分＋理论教学学分＋实验教学学分=总学分数。

**二、课程设置表**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **类别** | **课 程**  **代 码** | **课程名称** | | **是否必修** | **学时数** | | | | **学分数** | **开课**  **学期** | **毕业**  **要求** |
| **总学时** | **实验** | **实习** | **其他** |
| **公 共 基 础 课** | 031101371 | 中国近现代史纲要 | | 必  修  课 | 40 |  |  | 4 | 2.5 | 1 | №8 |
| 031101661 | 思想道德与法治 | | 40 |  |  | 4 | 2.5 | 2 | №8 |
| 031101522 | 马克思主义基本原理 | | 40 |  |  | 4 | 2.5 | 3 | №8 |
| 031101423 | 毛泽东思想和中国特色社会主义理论体系概论 | | 72 |  |  | 24 | 4.5 | 4 | №8 |
| 031101331 | 形势与政策 | | 128 |  |  |  | 2.0 | 1-8 | №8 |
| 044101382 | 学术英语（一） | 英语A班修读 | 48 |  |  |  | 3.0 | 1 | №10 |
| 044102453 | 学术英语（二） | 48 |  |  |  | 3.0 | 2 | №10 |
| 044103681 | 大学英语（一） | 英语B、C班修读 | 48 |  |  |  | 3.0 | 1 | №10 |
| 044103691 | 大学英语（二） | 48 |  |  |  | 3.0 | 2 | №10 |
| 045101644 | 大学计算机基础 | | 32 |  |  | 32 | 1.0 | 1 | №5 |
| 052100332 | 体育（一） | | 36 |  |  | 36 | 1.0 | 1 | №12 |
| 052100012 | 体育（二） | | 36 |  |  | 36 | 1.0 | 2 | №12 |
| 052100842 | 体育（三） | | 36 |  |  | 36 | 1.0 | 3 | №12 |
| 052100062 | 体育（四） | | 36 |  |  | 36 | 1.0 | 4 | №12 |
| 006100112 | 军事理论 | | 36 |  |  | 18 | 2.0 | 2 | №9 |
| 045100211 | C++程序设计 | | 64 |  |  | 8 | 4.0 | 1 | №2,5 |
| 074102992 | 工程制图 | | 48 |  |  |  | 3.0 | 1 | №2 ,5 |
| 040100051 | 微积分Ⅱ（一） | | 80 |  |  |  | 5.0 | 1 | №1,2 |
| 040100411 | 微积分Ⅱ（二） | | 80 |  |  |  | 5.0 | 2 | №1,2 |
| 040100401 | 线性代数与解析几何 | | 48 |  |  |  | 3.0 | 1 | №1,2 |
| 040100023 | 概率论与数理统计 | | 48 |  |  |  | 3.0 | 2 | №1,2 |
| 041101941 | 力学 | | 48 |  |  |  | 3.0 | 1 | №1,2 |
| 041102021 | 热学 | | 32 |  |  |  | 2.0 | 2 | №1,2 |
| 041102011 | 电磁学 | | 48 |  |  |  | 3.0 | 2 | №1,2 |
| 041101272 | 光学 | | 32 |  |  |  | 2.0 | 3 | №1,2 |
| 041100161 | 基础物理实验（一） | | 32 | 32 |  |  | 1.0 | 2 | №1,2 |
| 041101482 | 基础物理实验（二） | | 48 | 48 |  |  | 1.5 | 4 | №1,2 |
| 041102281 | 基础物理实验（三） | | 48 | 48 |  |  | 1.5 | 4 | №1,2 |
|  | 人文科学领域、社会科学领域 | | 通  识  课 | 128 |  |  |  | 8.0 |  | №8 |
|  | 科学技术领域 | | 32 |  |  |  | 2.0 |  | №8 |
| **合计** | | | | 1444 | 128 |  | 238 | 74 |  |  |

备注：学时中其他可以为上机和实践学时。

**二、课程设置表（续）**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **类别** | **课 程**  **代 码** | **课程名称** | **是否必修** | **学时数** | | | | **学分数** | **开课**  **学期** | **毕业**  **要求** |
| **总学时** | **实验** | **实习** | **其他** |
| **专业基础课** | 041100641 | 宇宙的演化 | 必 | 16 |  |  |  | 1.0 | 1 | №1 |
| 041101001 | 物理学的进化 | 必 | 16 |  |  |  | 1.0 | 2 | №1 |
| 041102211 | 理论力学IV | 必 | 64 |  |  |  | 4.0 | 3 | №1,2 |
| 041101891 | 数学物理方法 | 必 | 64 |  |  |  | 4.0 | 3 | №1,2 |
| 041102111 | 物理学中的数值方法 | 必 | 48 |  |  | 18 | 2.5 | 3 | №1,2 |
| 041102101 | 计算物理方法与实践 | 必 | 48 |  |  | 18 | 2.5 | 4 | №1,2 |
| 041101441 | 原子物理 | 必 | 64 |  |  |  | 4.0 | 4 | №1,2 |
| 041100992 | 电动力学II | 必 | 64 |  |  |  | 4.0 | 4 | №1,2 |
| 041101512 | 量子力学II | 必 | 64 |  |  |  | 4.0 | 5 | №1,2 |
| 041102241 | 热力学与统计物理II | 必 | 64 |  |  |  | 4.0 | 5 | №1,2 |
| 041100331 | 固体物理 | 必 | 64 |  |  |  | 4.0 | 6 | №1,2 |
| 041100151 | 近代物理实验 | 必 | 64 | 64 |  |  | 2.0 | 5 | №1,2 |
| 041101831 | 应用物理专业实验 | 必 | 64 | 64 |  |  | 2.0 | 6 | №1,2 |
| 041102131 | 高等量子力学 | 必 | 48 |  |  |  | 3.0 | 7 | №1,3,5 |
| 041102121 | 群论 | 必 | 48 |  |  |  | 3.0 | 6 | №1,2,3,5 |
| 024100291 | 电路II | 必 | 64 |  |  |  | 4.0 | 2 | №2,4 |
| 024100281 | 电路实验 | 必 | 16 | 16 |  |  | 0.5 | 3 | №2,4 |
| **合　计** | | 必 | 880 | 144 |  | 36 | 49.5 |  |  |
| **选修课** | 模块1：凝聚态物理模块 | | | | | | | | | |
| 041102251 | 固体理论II | 选 | 32 |  |  |  | 2.0 | 7 | №1,2,3 |
| 041100532 | 半导体物理与器件 | 选 | 48 |  |  |  | 3.0 | 6 | №2,3 |
| 041101262 | 材料物理 | 选 | 32 |  |  |  | 2.0 | 6 | №3,5 |
| 041102091 | 物理学进展 | 选 | 48 |  |  |  | 3.0 | 6 | №2,3 |
| 041102081 | 凝聚态物理实验方法 | 选 | 32 |  |  |  | 2.0 | 7 | №3,4,5 |
|  | 备注 | 本模块共计12个学分 | | | | | | | |
| 模块2：电子技术模块 | | | | | | | | | |
| 035100172 | 模拟电子技术II | 选 | 64 |  |  |  | 4.0 | 5 | №2,4 |
| 070100042 | 模拟电子技术实验 | 选 | 16 | 16 |  |  | 0.5 | 6 | №2,4 |
| 035100341 | 数字电子技术II | 选 | 64 |  |  |  | 4.0 | 6 | №2,4 |
| 035101342 | 数字电子技术实验 | 选 | 16 | 16 |  |  | 0.5 | 6 | №2,4 |
| 041101423 | 信号与系统 | 选 | 48 |  |  |  | 3.0 | 6 | №1,2 |
|  | 备注 | 本模块共计12个学分 | | | | | | | |
| 模块3：光电感知与通信模块 | | | | | | | | | |
| 041101423 | 信号与系统 | 选 | 48 |  |  |  | 3.0 | 4 | №1,2 |
| 041100483 | 数字信号处理 | 选 | 48 |  |  |  | 3.0 | 5 | №2,3 |
| 041101292 | 传感技术 | 选 | 32 |  |  |  | 2.0 | 5 | №3,4 |
| 041101911 | 光纤通信 | 选 | 48 |  |  |  | 3.0 | 6 | №3,4 |
| 041102061 | 物联网基础 | 选 | 32 |  |  |  | 2.0 | 6 | №3,4 |
|  | 备注 | 本模块共计13个学分 | | | | | | | |
| 公共选修课 | | | | | | | | | |
| 041101992 | 新产业前沿及其物理基础 | 选 | 32 |  |  |  | 2.0 | 5 |  |
| [037102783](javascript:void(0);) | 大学化学 | 选 | 32 |  |  |  | 2.0 | 3 | №2,3 |
| [037101943](javascript:void(0);) | 大学化学实验 | 选 | 16 | 16 |  |  | 0.5 | 4 | №3,4,5 |
| 041100421 | 理论声学 | 选 | 48 |  |  |  | 3.0 | 5 | №2,3 |
| 041102151 | 广义相对论 | 选 | 32 |  |  |  | 2.0 | 7 | №2,3 |
| 041102031 | 原子核物理 | 选 | 32 |  |  |  | 2.0 | 7 | №2,3 |
| 041102141 | 声学进展 | 选 | 32 |  |  |  | 2.0 | 6 | №2,3 |
| 020100051 | 创新研究训练 | 选 | 32 |  |  |  | 2.0 | 7 |  |
| 020100041 | 创新研究实践I | 选 | 32 |  |  |  | 2.0 | 7 |  |
| 020100031 | 创新研究实践II | 选 | 32 |  |  |  | 2.0 | 7 |  |
| 020100061 | 创业实践 | 选 | 32 |  |  |  | 2.0 | 7 |  |
| **合　计** | | 选 | 选修课修读最低要求18学分 | | | | | | |

备注：

1. 学时中其他可以为上机和实践学时。

**2．总选修学分要求最低为18分。有三个选修模块：凝聚态物理模块、电类课程模块和光电感知与通信模块。学生选定某个模块后，必须选修这个模块内的所有课程，其余的学分再在公共选修课或其它模块中选修。**

3．“严济慈英才班”学生必须参与相关的课外科研活动。学生根据自己开展科研训练项目、学科竞赛、发表论文、获得专利和自主创业等情况申请折算为一定的专业选修课学分（创新研究训练、创新研究实践I、创新研究实践II、创业实践等创新创业课程）。每个学生累计申请为专业选修课总学分不超过4个学分。经学校批准认定为选修课学分的项目、竞赛等不再获得对应第二课堂的创新学分。

**三、集中实践教学环节**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **课 程**  **代 码** | **课程名称** | **是否必修** | **学时数** | | **学分数** | **开课**  **学期** | **毕业要求** |
| **实践** | **授课** |
| 006100151 | 军事技能 | 必 | 2周 |  | 2.0 | 1 | №9 |
| 031101551 | 马克思主义理论与实践 | 必 | 2周 |  | 2.0 | 3 | №8 |
| 041102271 | 研究与探索实践 | 必 | 6周 |  | 6.0 | 7 | №3,5 |
| 041101671 | 计算物理课程设计 | 必 | 2周 |  | 2.0 | 4 | №3,4 |
| 041101881 | 固体物理课程设计 | 必 | 2周 |  | 2.0 | 6 | №3,4 |
| 041100561 | 毕业实习 | 必 | 4周 |  | 4.0 | 8 | №5 |
| 041100554 | 毕业设计 | 必 | 17周 |  | 12.0 | 7,8 | №3,4,5 |
| **合　计** | | 必 | 35周 |  | 30.0 |  |  |

**四、第二课堂**

第二课堂由人文素质教育和创新能力培养两部分组成。

**1.人文素质教育基本要求**

学生在取得专业教学计划规定学分的同时，还应结合自己的兴趣适当参加课外人文素质教育活动，参加活动的学分累计不少于3个学分。

**2.创新能力培养基本要求**

学生在取得本专业教学计划规定学分的同时，还必须参加国家创新创业训练计划、广东省创新创业训练计划、SRP（学生研究计划）、百步梯攀登计划或一定时间的各类课外创新能力培养活动（如学科竞赛、学术讲座等），参加活动的学分累计不少于4个学分。

**“Yan Jici” Class of Applied Physics**

**Program Code:070202（Bachelor）**

**Duration：4 years（Bachelor）**

**Educational Objectives:**

We will cultivate “Three abilities” (learning ability, ideological ability, action ability) and "Three creations" (innovation, creation, entrepreneurship) undergraduate talents that have a "Family-country" emotion and a global vision and develop morality, intelligence, physique, aesthetics, and labor in an all-round way. Students are trained to have solid mathematical and physical foundation and know frontiers of physics, to possess good scientific accomplishment and strong research and innovation perception and ability, to have good competition and cooperation spirit, to become comprehensive, innovative and active researchers with international visions and the potential to become international first-class scientists.

**Student Outcomes:**

**№1. Fundamental Knowledge**: An ability to apply knowledge of mathematics, natural science, physics fundamentals and other specializations to the solution of complex problems in applied physics.

№1.1 An ability to apply knowledge of mathematics, natural science, physics fundamentals and other specializations to the solution of complex problems in applied physics.

№1.2 An ability to apply languages of mathematics, natural science and physics fundamentals to the expressions of complex problems in applied physics, and mathematical models can be established and solved for specific objects in complex problems in applied physics.

№1.3 An ability to use relevant knowledge and mathematical models to derive and analyze complex problems in applied physics.

№1.4 An ability to apply relevant knowledge and mathematical methods to compare and synthesize solutions to complex problems in applied physics.

**№2. Problem Analysis:** An ability to identify, formulate and analyze complex applied physics problems, reaching to substantiated conclusions using basic principles of mathematics, science, and physics.

№2.1 An ability to correctly express complex problems in applied physics based on relevant scientific principles and mathematical methods.

№2.2 An ability to analyze and demonstrate specific problems in physic by combing basic principles and relevant literatures, as well as proposing possible solutions and recognize the diversity of them.

№2.3 An ability to apply basic principles and literature research to analyze the influencing factors in applied physics and attain effective conclusions.

**№3. Research:** An ability to conduct investigations of complex physical problems based on scientific theories and adopting scientific methods including design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions.

№3.1 An ability to investigate and analyze complex problems aiming at the applied physics with the basic principles of natural science and professionalism through literature research and related methods.

№3.2 An ability to choose research route and design the using plans according to the requirements in complex problems in applied physics.

№3.3 An ability to construct experimental systems according to the experimental plan and safely carry out the experiments and correctly collect the experimental data aiming at the complex problems of physics.

№3.4 An ability to analyze and explain the experimental results and obtain reasonable and effective conclusions through information synthesis.

**№4. Appling Modern Tools:** An ability to create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex engineering activities, with an understanding of the limitations.

№4.1 Understanding the principles and methods of modern instruments, engineering and IT tools, and simulation software commonly used in applied physics, with an understanding of their limitations.

№4.2 An ability to choose and use appropriate instruments, information, engineering tools and simulation software to analyze, compute and design complex problems in applied physics.

№4.3 An ability to develop or select modern tools that meet specific needs for specific objects of applied physics, as well as simulate and predict professional problems, and analyze its limitations.

**№5. Engineering and Society:** An ability to apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.

№5.1 Fully understand the crucial role of applied physics in technological progress and social development, know the technical standard system, intellectual property rights, industrial polices and laws in related fields of applied physics, understanding the impact of different social cultures on scientific activities.

№5.2 An ability to analyze and evaluate the impact of science on society, health, safety, law, and culture, as well as the impact of these constrains on project implementation through experiments, practice and internships in applied physics, so well as understand and clarify the responsibilities and obligations that should be undertaken.

**№6. Environment and Sustainable Development:** An ability to understand and evaluate the impact of professional physical solutions in environmental and societal contexts and demonstrate knowledge of and need for sustainable development.

№6.1 Understand the concept and connection of environmental protection and sustainable development.

№6.2 Can fully understand the damage and hidden dangers that may be caused to humans and the environment in the practice of applied physics, fully consider and evaluate environmental impact factors when formulating complex problem solutions, and be able to self-discipline from the perspective of environmental protection and sustainable development.

**№7. Professional Standards:** Have an understanding of humanity and social science literacy, being able to understand and abide by professional ethics and standards responsibly in physical practice.

№7.1 Have an understanding of humanity and social science literacy and a firm belief in socialism and a sense of social responsibility, have correct values, understand the relationship between individuals and society, and know China’s national conditions.

№7.2 Understand the scientific professional ethics and norms of honesty, fairness and integrity, and be able to consciously abide by them in scientific practice.

№7.3 Understand the social responsibilities of scientists for the safety, health and well-being of the public, and the environmental protection, and be able to judge and evaluate the social responsibilities of practical activities in the field of applied physics, and consciously fulfill their responsibilities.

**№8. Individual and Teams:** An ability to function effectively as an individual, and as a member or leader in diverse teams and in interdisciplinary contexts.

№8.1 Have a sense of teamwork and be able to communicate effectively with others and work together in interdisciplinary contexts.

№8.2 Be able to treat the role of individuals, team members and leaders correctly, be able to work independently or cooperatively in a team, and be able to organize, coordinate and direct the team work.

**№9. Communication:** An ability to communicate effectively on complex physical problems with the physics community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, give and receive clear instructions, and communicate in cross-cultural contexts with international perspective.

№9.1 Be able to accurately express one’s own views, respond to queries and understand the differences in communication with peers and the public in terms of oral, manuscripts, diagrams, etc. on applied physics professional issues.

№9.2 Understand the international development trends and research hotspots in the field of applied physics, understand and respect the differences and diversity of different cultures in the world.

№9.3 Have the language and written expression skills for cross-cultural communication, and can communicate with each other in a cross-cultural context on professional issues in applied physics.

**№10. Lifelong Learning:** A recognition of the need for, and an ability to engage in independent and life-long learning with the ability to learn continuously and adapt to new developments.

№10.1 Have a good physical and psychological qualities, a correct world outlook, values and outlook on life, agree with the concepts of lifelong education and continuous education, and be able to recognize the necessity of independent learning and lifelong learning in the context of social development.

№10.2 An ability to learn independently, to learn foreign languages consciously, to track and obtain information using modern technologies such as computers and search engines, and to adapt to the development of new technologies in the field of applied physics, including the ability to understand new technologies, the ability to summarize and propose new questions.

**Program Profile：**

The Applied Physics undergraduate program was founded in 1986. It was renamed as Applied Physics (Optical Information Science and Technology) in 1996. It was restored as Applied Physics in 2003 under the approval of the university. The “Yan Jici” Class of Applied Physics was founded in 2017.

Teachers in our program have good teacher’s morality, and have background and research directions covering condensed matter physics, theoretical physics, and acoustics, as well as physical electronics, materials physics and chemistry. Our research fields follow the development of physics, and have distinctive features and strong expansion.

Our program has an undergraduate major lab with an area bigger than 300 square meters, and the instruments and equipment have a value larger than 4 million yuan. Furthermore, we have three related labs in acoustic crystal, high pressure physics, and condensed matter physics. We also have supports from IOP of CAS and CSNS for both teachers and instruments.

**Program Features:**

In corporation with IOP of CAS and CSNS, the “Yan Jici” Class of Applied Physics explore the road of training leading researchers with active ideas and international visions and having the potential to becoming international first-class scientists.

**Degree Conferred:**

Bachelor of Natural Science

**Core Courses:**

Mathematical Methods for Physicists,Mechanics, Thermodynamics, Electromagnetism, Optics, Atomic Physics,TheoreticalMechanics, Electrodynamics, Thermodynamics and Statistical Physics, Quantum Mechanics, Solid State Physics, Numerical Methods in Physics, Methodology and Practice in Computational Physics.

**Featured Courses:**

Freshmen Seminars: Evolution of Physics, Evolution of the Universe

Special Topics: Frontier and physics of emerging industry

Bilingual Courses: Mechanics, Thermodynamics, Electromagnetism, Optics, Mathematical Methods for Physicists, Quantum Mechanics, Solid State Physics, Numerical Methods in Physics, Methodology and Practice in Computational Physics, Materials Physics

MOOC: Numerical Methods in Physics, Methodology and Practice in Computational Physics.

Subject Frontiers Courses: Frontier and physics of emerging industry

Interdisciplinary Courses: University Chemistry, University Chemistry Experiment

Baccalaureate-Master’s Integrated Courses: Solid State Theory II, Advanced Quantum Mechanics, Advances in physics, Advances in Acoustics, Experiment Methods in Condensed Matter Physics

Cooperative Courses with Enterprises: Manufactural Practice, Practice on Diploma Project

Innovation Practice: Innovation Research Training, Innovation Research Practice I, Innovation Research Practice II, Research and Discovery Practice

Special Designs:Course Design for Computational Physics, Course Design of Solid State Physics

**1. Registration Form of Curriculum Credits**

**1.1 Credits Registration Form**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Course Category | Requirement | Credits | Academic Hours | Remarks |
| General Basic Courses | Compulsory | 64 | 1268 |  |
| General Education | 10 | 160 |  |
| Specialty Basic Courses | Compulsory | 49.5 | 880 |  |
| Elective Courses | Elective | 18 | 288 |  |
| Total | | 141.5 | 2596 |  |
| Practice Training (Weeks) |  | 30 | 35 weeks |  |
| Credits Required for Graduation | 171.5 | | | |

**1.2 Category Registration Form**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Academic Hours | | | | | Credits | | | | | | |
| Total | Include | | Include | | Total | Include | | Include | | | Include |
| Compulsory | Elective | Theory Course | Lab | Compulsory | Elective | Practice-concentrated Training | Theory Course Credits | Lab | Innovation and Entrepreneurship Education |
| 2596 | 2148 | 448 | 2066 | 530 | 171.5 | 153.5 | 18 | 30 | 123 | 18.5 | 6 |

**2. Courses Schedule**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Course Category | Course No. | Course Title | | C/E | Total Curriculum Hours | | | | Credits | Semester | Student Outcomes |
| Class Hours | Lab Hours | Practice Hours | Other Hours |
| **General Basic Courses** | 031101371 | Skeleton of Chinese Modern History | | C | 40 |  |  | 4 | 2.5 | 1 | №8 |
| 031101661 | Cultivation of Thought and Morals & Fundamental of Law | | 40 |  |  | 4 | 2.5 | 2 | №8 |
| 031101522 | Fundamentals of Marxism Principle | | 40 |  |  | 4 | 2.5 | 3 | №8 |
| 031101423 | Thought of Mao ZeDong and Theory of Socialism with Chinese Characteristics | | 72 |  |  | 24 | 4.5 | 4 | №8 |
| 031101331 | Analysis of the Situation & Policy | | 128 |  |  |  | 2.0 | 1-8 | №8 |
| 044101382 | English for Academic Purposes (1) | for English Class A | 48 |  |  |  | 3.0 | 1 | №10 |
| 044102453 | English for Academic Purposes (2) | 48 |  |  |  | 3.0 | 2 | №10 |
| 044103681 | College English (1) | for English Class B、C | 48 |  |  |  | 3.0 | 1 | №10 |
| 044103691 | College English (2) | 48 |  |  |  | 3.0 | 2 | №10 |
| 045101644 | Foundations of Computer | | 32 |  |  | 32 | 1.0 | 1 | №5 |
| 052100332 | Physical Education (1) | | 36 |  |  | 36 | 1.0 | 1 | №12 |
| 052100012 | Physical Education (2) | | 36 |  |  | 36 | 1.0 | 2 | №12 |
| 052100842 | Physical Education (3) | | 36 |  |  | 36 | 1.0 | 3 | №12 |
| 052100062 | Physical Education (4) | | 36 |  |  | 36 | 1.0 | 4 | №12 |
| 006100112 | Military Principle | | 36 |  |  | 18 | 2.0 | 2 | №9 |
| 045100211 | Programming in C++ | | 64 |  |  | 8 | 4.0 | 1 | №2,5 |
| 074102992 | Engineering Drawing | | 48 |  |  |  | 3.0 | 1 | №2 ,5 |
| 040100051 | Calculus(1) | | 80 |  |  |  | 5.0 | 1 | №1,2 |
| 040100411 | Calculus(2) | | 80 |  |  |  | 5.0 | 2 | №1,2 |
| 040100401 | Linear Algebra & Analytic Geometry | | 48 |  |  |  | 3.0 | 1 | №1,2 |
| 040100023 | Probability & Mathematical Statistics | | 48 |  |  |  | 3.0 | 2 | №1,2 |
| 041101941 | Mechanics | | 48 |  |  |  | 3.0 | 1 | №1,2 |
| 041102021 | Thermodynamics | | 32 |  |  |  | 2.0 | 2 | №1,2 |
| 041102011 | Electromagnetism | | 48 |  |  |  | 3.0 | 2 | №1,2 |
| 041101272 | Optics | | 32 |  |  |  | 2.0 | 3 | №1,2 |
| 041100161 | Experiment of Fundamental Physics I | | 32 | 32 |  |  | 1.0 | 2 | №1,2 |
| 041101482 | Experiment of Fundamental Physics II | | 48 | 48 |  |  | 1.5 | 4 | №1,2 |
| 041102281 | Experiment of Fundamental Physics III | | 48 | 48 |  |  | 1.5 | 4 | №1,2 |
|  | Humanities, Social Science | | E | 128 |  |  |  | 8.0 |  | №8 |
|  | Science and Technology | | 32 |  |  |  | 2.0 |  | №8 |
| **Total** | | | | 1444 | 128 |  | 238 | 74 |  |  |

**2. Courses Schedule**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Course Category | Course No. | Course Title | C/E | Total Curriculum Hours | | | | Credits | Semester | Student Outcomes |
| Class Hours | Lab Hours | Practice Hours | Other Hours |
| **Specialty Basic Courses** | 041100641 | Evolution of the Universe | C | 16 |  |  |  | 1.0 | 1 | №1 |
| 041101001 | Evolution of Physics | C | 16 |  |  |  | 1.0 | 2 | №1 |
| 041102211 | Theoretical Mechanics IV | C | 64 |  |  |  | 4.0 | 3 | №1,2 |
| 041101891 | Mathematical Methods for Physicists | C | 64 |  |  |  | 4.0 | 3 | №1,2 |
| 041102111 | Numerical Methods in Physics | C | 48 |  |  | 18 | 2.5 | 3 | №1,2 |
| 041102101 | Methodology and Practice in Computational Physics | C | 48 |  |  | 18 | 2.5 | 4 | №1,2 |
| 041101441 | Atomic Physics | C | 64 |  |  |  | 4.0 | 4 | №1,2 |
| 041100992 | Electrodynamics II | C | 64 |  |  |  | 4.0 | 4 | №1,2 |
| 041101512 | Quantum Mechanics II | C | 64 |  |  |  | 4.0 | 5 | №1,2 |
| 041102241 | Thermodynamics and Statistical Physics II | C | 64 |  |  |  | 4.0 | 5 | №1,2 |
| 041100331 | Solid State Physics | C | 64 |  |  |  | 4.0 | 6 | №1,2 |
| 041100151 | Modern Physical Experiment | C | 64 | 64 |  |  | 2.0 | 5 | №1,2 |
| 041101831 | Special Experiments for Applied Physics | C | 64 | 64 |  |  | 2.0 | 6 | №1,2 |
| 041102131 | Advanced Quantum Mechanics | C | 48 |  |  |  | 3.0 | 7 | №1,3,5 |
| 041102121 | Group Theory | C | 48 |  |  |  | 3.0 | 6 | №1,2,3,5 |
| 024100291 | Electric Circuits II | C | 64 |  |  |  | 4.0 | 2 | №2,4 |
| 024100281 | Experiment of Circuit | C | 16 | 16 |  |  | 0.5 | 3 | №2,4 |
| **Total** | | C | 880 | 144 |  | 36 | 49.5 |  |  |
| **Elective Courses** | Module No 1: Condensed Matter Physics Module | | | | | | | | | |
| 041102251 | Solid State Theory II | E | 32 |  |  |  | 2.0 | 7 | №1,2,3 |
| 041100532 | Semiconductor Physics and Devices | E | 48 |  |  |  | 3.0 | 6 | №2,3 |
| 041101262 | Materials Physics | E | 32 |  |  |  | 2.0 | 6 | №3,5 |
| 041102091 | Advances in physics | E | 48 |  |  |  | 3.0 | 6 | №2,3 |
| 041102081 | Experiment Methods in Condensed Matter Physics | E | 32 |  |  |  | 2.0 | 7 | №3,4,5 |
|  | Remarks | Module total credits: 12 | | | | | | | |
| Module No. 2: Electric Technology | | | | | | | | | |
| 035100172 | Analog Electronics | E | 64 |  |  |  | 4.0 | 5 | №2,4 |
| 070100042 | Experiment of Analog Electronics | E | 16 | 16 |  |  | 0.5 | 6 | №2,4 |
| 035100341 | Digital Electronics | E | 64 |  |  |  | 4.0 | 6 | №2,4 |
| 035101342 | Experiment of Digital Electronics | E | 16 | 16 |  |  | 0.5 | 6 | №2,4 |
| 041101423 | Signals and systems | E | 48 |  |  |  | 3.0 | 6 | №1,2 |
|  | Remarks | Module total credits: 12 | | | | | | | |
| Module No. 3: Optoelectronics Perception and Communication | | | | | | | | | |
| 041101423 | Signals and Systems | E | 48 |  |  |  | 3.0 | 4 | №1,2 |
| 041100483 | Digital Signal Processing | E | 48 |  |  |  | 3.0 | 5 | №2,3 |
| 041101292 | Sensor Technology | E | 32 |  |  |  | 2.0 | 5 | №3,4 |
| 041101911 | Optical Fiber Communications | E | 48 |  |  |  | 3.0 | 6 | №3,4 |
| 041102061 | Fundamentals of Internet of Things | E | 32 |  |  |  | 2.0 | 6 | №3,4 |
|  | Remarks | Module total credits: 13 | | | | | | | |
| General Education of Physics | | | | | | | | | |
| 041101992 | Frontier of new Industry and Its Physical Foundation | E | 32 |  |  |  | 2.0 | 5 |  |
| [037102783](javascript:void(0);) | University Chemistry | E | 32 |  |  |  | 2.0 | 3 | №2,3 |
| [037101943](javascript:void(0);) | University Chemistry Experiment | E | 16 | 16 |  |  | 0.5 | 4 | №3,4,5 |
| 041100421 | Theoretical Acoustics | E | 48 |  |  |  | 3.0 | 5 | №2,3 |
| 041102151 | General Relativity | E | 32 |  |  |  | 2.0 | 7 | №2,3 |
| 041102031 | Nuclear Physics | E | 32 |  |  |  | 2.0 | 7 | №2,3 |
| 041102141 | Advances in Acoustics | E | 32 |  |  |  | 2.0 | 6 | №2,3 |
| 020100051 | Innovation Research Training | E | 32 |  |  |  | 2.0 | 7 |  |
| 020100041 | Innovation Research Practice I | E | 32 |  |  |  | 2.0 | 7 |  |
| 020100031 | Innovation Research Practice II | E | 32 |  |  |  | 2.0 | 7 |  |
| 020100061 | Entrepreneurial Practice | E | 32 |  |  |  | 2.0 | 7 |  |
| **Total** | | E | Minimum elective course credits required: 18 | | | | | | |

**3. Practice-concentrated Training**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Course No | Course Title | C/E | Total Curriculum Hours | | Credits | Semester | Student Outcomes |
| Practice  weeks | Lecture Hours |
| 006100151 | Military Training | C | 2 weeks |  | 2.0 | 1 | №9 |
| 031101551 | Marxism Theory and Practice | C | 2 weeks |  | 2.0 | 3 | №8 |
| 041102271 | Research and Discovery Practice | C | 6 weeks |  | 6.0 | 7 | №3,5 |
| 041101671 | Course Design for Computational Physics | C | 2 weeks |  | 2.0 | 4 | №3,4 |
| 041101881 | Course Design of Solid State Physics | C | 2 weeks |  | 2.0 | 6 | №3,4 |
| 041100561 | Practice on Diploma Project（containing labor course 32 ac. hrs） | C | 4 weeks |  | 4.0 | 8 | №5 |
| 041100554 | Diploma Project | C | 17周 |  | 12.0 | 7,8 | №3,4,5 |
| **Total** | | C | 35 weeks |  |  |  |  |

**4.“Second Classroom” Activities**

“Second Classroom” Activities are comprised of two parts, Humanities Quality Education and Innovative Ability Cultivation.

1)Basic Requirements of Humanities Quality Education

Besides gaining course credits listed in one’s subject teaching curriculum, a student is required to participate in extracurricular activities of Humanities Quality Education based on one’s interest, acquiring no less than three credits.

2)Basic Requirements of Innovative Ability Cultivation

Besides gaining course credits listed in one’s subject teaching curriculum, a student is required to participate in any one of the following activities: National Undergraduate Training Programs for Innovation and Entrepreneurship, Guangdong Undergraduate Training Programs for Innovation and Entrepreneurship, Student Research Program (SRP), One-hundred-steps Innovative Program, or any other extracurricular activities of Innovative Ability Cultivation that last a certain period of time (e.g. subject contests, academic lectures), acquiring no less than four credits.

**物理学类（含应用物理学、光电信息科学与工程）**

**Physics**

**(Applied Physics, Opto-electronics Information Science and Engineering)**

**专业类介绍**

物理学类是依托华南理大学物理与光电学院的本科专业类，属于物理学一级学科，包含应用物理学和光电信息科学与工程(光电信息)两个专业方向。学院现有物理学一级学科博士点及博士后流动站、物理电子学二级学科博士点及博士后流动站。物理学学科于2011年进入国际ESI全球排名前1%，于2018年获批广州市重点学科。

**专业类培养特色:**

构建专业类课程平台，夯实学生的学科基础，促进学生全面成长成才，满足学生个性化、多元化发展需求，为学生的长远发展奠定基础。通过后期专业教育体系的严格训练，培养坚持社会主义道路，德智体美全面发展，基本理论和基础知识扎实，专业实践能力强，具有家国情怀和全球视野的“三创型”（创新、创造、创业）本科人才。

**专业类培养面向:**

学生在确认主修专业后，进入专业培养阶段。物理学类共有两个专业教育培养通道，主要面向的专业有：

1.应用物理学

2.光电信息科学与工程（光电信息）

**一、专业类课程学分登记表**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 课程类别 | 课程要求 | 学分 | 学时 | 备注 |
| 公共基础课 | 必修 | 47.0 | 932 |  |
| 通识 | 10.0 | 160 |  |
| 专业基础课 | 必修 | 6.0 | 96 |  |
| 集中实践教学环节（周） | 必修 | 2.0 | 2周 |  |
| 合计 | 65.0 | | |  |

**二、专业类课程设置表**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **类别** | **课 程**  **代 码** | **课程名称** | | **是否必修** | **学时数** | | | | **学分数** | **开课**  **学期** |
| **总学时** | **实验** | **实习** | **其他** |
| **公 共 基 础 课** | 031101371 | 中国近现代史纲要 | | 必 | 40 |  |  | 4 | 2.5 | 1 |
| 031101661 | 思想道德与法治 | | 必 | 40 |  |  | 4 | 2.5 | 2 |
| 031101331 | 形势与政策 | | 必 | 128 |  |  |  | 2.0 | 1-8 |
| 044101382 | 学术英语（一） | 英语A班修读 | 必 | 48 |  |  |  | 3.0 | 1 |
| 044102453 | 学术英语（二） | 必 | 48 |  |  |  | 3.0 | 2 |
| 044103681 | 大学英语（一） | 英语B、C班修读 | 必 | 48 |  |  |  | 3.0 | 1 |
| 044103691 | 大学英语（二） | 必 | 48 |  |  |  | 3.0 | 2 |
| 045101644 | 大学计算机基础 | | 必 | 32 |  |  | 32 | 1.0 | 1 |
| 052100332 | 体育（一） | | 必 | 36 |  |  | 36 | 1.0 | 1 |
| 052100012 | 体育（二） | | 必 | 36 |  |  | 36 | 1.0 | 2 |
| 006100112 | 军事理论 | | 必 | 36 |  |  | 18 | 2.0 | 2 |
| 045100772 | C++程序设计基础 | | 必 | 40 |  |  | 8 | 2.0 | 1 |
| 074102992 | 工程制图 | | 必 | 48 |  |  |  | 3.0 | 1 |
| 040100051 | 微积分Ⅱ（一） | | 必 | 80 |  |  |  | 5.0 | 1 |
| 040100411 | 微积分Ⅱ（二） | | 必 | 80 |  |  |  | 5.0 | 2 |
| 040100401 | 线性代数与解析几何 | | 必 | 48 |  |  |  | 3.0 | 1 |
| 040100023 | 概率论与数理统计 | | 必 | 48 |  |  |  | 3.0 | 2 |
| 041100952 | 基础物理（一） | | 必 | 48 |  |  |  | 3.0 | 1 |
| 041100382 | 基础物理（二） | | 必 | 64 |  |  |  | 4.0 | 2 |
| 041100161 | 基础物理实验（一） | | 必 | 32 | 32 |  |  | 1.0 | 2 |
|  | 人文科学领域、社会科学领域 | | 通  识  课 | 128 |  |  |  | 8.0 |  |
|  | 科学技术领域 | | 32 |  |  |  | 2.0 |  |
| **合计** | | | 必 | 932 | 32 |  | 138 | 47.0 |  |
| **专业基础课** | 041101001 | 物理学的进化 | | 必 | 16 |  |  |  | 1.0 | 1 |
| 041101731 | 光学前沿 | | 必 | 16 |  |  |  | 1.0 | 2 |
| 024100291 | 电路Ⅱ | | 必 | 64 |  |  |  | 4.0 | 2 |
| **合计** | | | 必 | 96 |  |  |  | 6.0 |  |
| **集中实践环节** | 006100151 | 军事技能 | | 必 | 2周 |  |  |  | 2.0 | 1 |
| **合计** | | | 必 | 2周 |  |  |  | 2.0 |  |

**三、分流后教学计划**

详见各专业培养计划。

**Physics**

**(Applied Physics, Opto-electronics Information Science and Engineering)**

**Category Profile:**

Physics is an undergraduate major of School of Physics and Optoelectronics in South China University of Technology. It belongs to the first-level discipline of Physics and includes two major directions: Applied Physics and Opto-electronics Information Science and Engineering (Optoelectronic Information). The college has a doctoral program and postdoctoral program in the first-level discipline of Physics, a doctoral program and a postdoctoral program in the second-level discipline of Physical Electronics. The discipline of Physics entered the top 1% of the international ESI global ranking in 2011, and was approved as a key discipline of Guangzhou in 2018.

**Education Characteristics:**

The major of Physics will build a comprehensive physics course platform for students, consolidate the physics foundation, promote students' all-round growth, meet the individualized and diversified development needs, and lay the foundation for the long-term development of students. Through the rigorous training of the further major education system in Applied Physics or Opto-electronics Information Science and Engineering, we will cultivate the "Three creations" (innovation, creation, entrepreneurship) undergraduate talents that adhere to the socialist road with Chinese characteristics, develop morality, intelligence, physique, aesthetics and labor in an all-round way, have solid basic theories and basic knowledge, have strong professional practice ability, and have a "Family-country" emotion and a global vision.

**Education Directions:**

After confirming the major, the students enter the major education stage. There are two major education channels in Physics. The majors are:

1. Applied Physics

2.Opto-electronics Information Science and Engineering (Optoelectronic Information)

**Registration Form of Curriculum Credits**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Course Category | Requirement | Credits | Academic Hours | Remarks |
| General Basic Courses | Compulsory | 47.0 | 932 |  |
| General Education | 10.0 | 160 |  |
| Specialty Basic Courses | Compulsory | 6.0 | 96 |  |
| Practice Training (Weeks) | Compulsory | 2.0 | 2 weeks |  |
| Total | 65.0 | | |  |

1. **Courses Schedule**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Course Category | Course No. | Course Title | | C/E | Total Curriculum Hours | | | | Credits | Semester |
| Class Hours | Lab Hours | Practice Hours | Other Hours |
| **General Basic Courses** | 031101371 | Skeleton of Chinese Modern History | | C | 40 |  |  | 4 | 2.5 | 1 |
| 031101661 | Cultivation of Thought and Morals & Fundamental of Law | | C | 40 |  |  | 4 | 2.5 | 2 |
| 031101331 | Analysis of the Situation & Policy | | C | 128 |  |  |  | 2.0 | 1-8 |
| 044101382 | English for Academic Purposes (1) | for English Class A | C | 48 |  |  |  | 3.0 | 1 |
| 044102453 | English for Academic Purposes (2) | C | 48 |  |  |  | 3.0 | 2 |
| 044103681 | College English (1) | for English Class B、C | C | 48 |  |  |  | 3.0 | 1 |
| 044103691 | College English (2) | C | 48 |  |  |  | 3.0 | 2 |
| 045101644 | Foundations of Computer | | C | 32 |  |  | 32 | 1.0 | 1 |
| 052100332 | Physical Education (1) | | C | 36 |  |  | 32 | 1.0 | 1 |
| 052100012 | Physical Education (2) | | C | 36 |  |  | 32 | 1.0 | 2 |
| 006100112 | Military Principle | | C | 36 |  |  | 18 | 2.0 | 2 |
| 045100772 | C++ Programming Foundations | | C | 40 |  |  | 8 | 2.0 | 1 |
| 074102992 | Engineering Drawing | | C | 48 |  |  |  | 3.0 | 1 |
| 040100051 | Calculus(1) | | C | 80 |  |  |  | 5.0 | 1 |
| 040100411 | Calculus(2) | | C | 80 |  |  |  | 5.0 | 2 |
| 040100401 | Linear Algebra & Analytic Geometry | | C | 48 |  |  |  | 3.0 | 1 |
| 040100023 | Probability & Mathematical Statistics | | C | 48 |  |  |  | 3.0 | 2 |
| 041100952 | Fundamental of Physics(1) | | C | 48 |  |  |  | 3.0 | 1 |
| 041100382 | Fundamental of Physics(2) | | C | 64 |  |  |  | 4.0 | 2 |
| 041100161 | Experiment of Fundamental Physics Ⅰ | | C | 32 | 32 |  |  | 1.0 | 2 |
|  | Humanities, Social Science | | E | 128 |  |  |  | 8.0 |  |
|  | Science and Technology | | 32 |  |  |  | 2.0 |  |
| **Total** | | | C | 932 | 32 |  | 130 | 47.0 |  |
| **Specialty Basic Courses** | 041101001 | Evolution of Physics | | C | 16 |  |  |  | 1.0 | 1 |
| 041101731 | Frontiers in Optics | | C | 16 |  |  |  | 1.0 | 2 |
| 024100291 | Electric Circuits | | C | 64 |  |  |  | 4.0 | 2 |
|  |  | |  |  |  |  |  |  |  |
|  |  | |  |  |  |  |  |  |  |
|  |  | |  |  |  |  |  |  |  |
| **Total** | | | C |  |  |  |  |  |  |
| **Practice-concentrated Training** | 006100151 | Military Training | | C | 2 weeks |  |  |  | 2.0 | 1 |
|  |  | |  |  |  |  |  |  |  |
|  |  | |  |  |  |  |  |  |  |
|  |  | |  |  |  |  |  |  |  |
| **Total** | | | C | 2 weeks |  |  |  | 2.0 |  |
| E | Minimum elective course credits required: | | | | | |

1. **Educational plans after professional streaming**

Full details are given in educational plans for each specialty.

**应用物理学**

**Applied Physics**

**专业代码：070202 学 制：4年**

**Program Code: 070202 Duration：4 years**

**培养目标：**

培养家国情怀和全球视野兼备、“三力”（学习力、思想力、行动力）卓越、德智体美劳全面发展的“三创型”（创新、创造、创业）人才。培养具有宽广的数理基础，了解交叉学科；具有较好的科学素养及一定的研究、开发和管理能力；具有创新、创业意识；具有竞争和团队精神，在物理学及其相关的高科技领域中从事科研、教学、技术开发和管理的创新型复合型人才。

**毕业要求：**

**№1.基础知识：**能够将数学、自然科学、物理基础和专业知识用于解决应用物理的复杂问题。

№1.1 具备解决应用物理复杂问题所需的数学、自然科学、物理基础和专业知识。

№1.2 能将数学、自然科学、物理基础的语言工具用于应用物理复杂问题的表述，能够针对应用物理复杂问题中的具体对象建立数学模型并求解。

№1.3 能够将相关知识和数学模型用于推演、分析应用物理复杂问题。

№1.4 能够将相关知识和数学模型方法用于应用物理复杂问题解决方案的比较与综合。

**№2.问题分析：**能够应用数学、自然科学和物理专业知识的基本原理，识别、表达、并通过文献研究分析应用物理复杂问题，以获得有效结论。

№2.1 能基于相关科学原理和数学模型方法正确表达应用物理的复杂问题。

№2.2 针对应用物理的复杂问题，能结合基本原理和文献研究进行分析论证，提出可能的解决方案，并认识到解决方案的多样性。

№2.3能运用专业基本原理，借助文献研究，分析应用物理中的影响因素，并获得有效结论。

**№3.研究：**能够基于科学原理并采用科学方法对应用物理复杂问题进行研究，包括设计实验、分析与解释数据、并通过信息综合得到合理有效的结论。

№3.1 针对应用物理的复杂问题，能基于自然科学和专业基本原理，通过文献研究和相关方法，调研和分析复杂问题的解决方案。

№3.2针对应用物理的复杂问题，能根据要求选择研究路线，设计使用方案。

№3.3针对应用物理的复杂问题，能够根据实验方案构建实验系统，安全地开展实验，正确地采集实验数据。

№3.4 能对实验结果进行分析和解释，并通过信息综合得到合理有效的结论。

**№4.使用现代工具：**能够针对应用物理的复杂问题，开发、选择与使用恰当的技术、资源、现代工程工具和信息技术工具，包括对复杂科学或工程问题的预测与模拟，并能够理解其局限性。

№4.1 了解应用物理专业常用的现代仪器、信息技术工具、工程工具和模拟软件的使用原理和方法，并理解其局限性。

№4.2 能够选择与使用恰当的仪器、信息资源、工程工具和专业模拟软件，对应用物理复杂问题进行分析、计算与设计。

№4.3 能够针对应用物理的具体对象，开发或选用满足特定需求的现代工具，模拟和预测专业问题，能够分析其局限性。

**№5.科学与社会：**能够基于科学相关背景知识进行合理分析，评价应用物理复杂科学和工程问题解决方案对社会、健康、安全、法律以及文化的影响，并理解应承担的责任。

№5.1 充分认识应用物理学科在技术进步和社会发展中的重要地位和作用，了解应用物理相关领域的技术标准体系、知识产权、产业政策和法律法规，理解不同社会文化对科学活动的影响。

№5.2 通过应用物理学科的实验、实践和实习等，能分析和评价科学对社会、健康、安全、法律及文化的影响，以及这些制约因素对项目实施的影响，并理解和明确应承担的责任和义务。

**№6.环境和可持续发展：**能够理解和评价针对应用物理复杂问题的专业科学实践对环境、社会可持续发展的影响。

№6.1 知晓和理解环境保护和可持续发展的理念和内涵。

№6.2 能充分认识应用物理学科实践过程中可能对人类和环境造成的损害和隐患，在制定复杂问题解决方案时能充分考虑并评价环境影响因素，能站在环境保护和可持续发展的角度进行自我约束。

**№7.职业规范：**具有人文社会科学素养、社会责任感，能够在应用物理实践中理解并遵守科学职业道德和规范，履行责任。

№7.1 具有人文社会科学素养、坚定的社会主义信念和社会责任感，有正确的价值观，理解个人与社会的关系，了解中国国情。

№7.2 理解诚实公正、诚信守则的科学职业道德和规范，并能在科学实践中自觉遵守。

№7.3 理解科学家对公众的安全、健康和福祉以及环境保护的社会责任，能对应用物理专业领域实践活动的社会责任进行判断和评鉴，并自觉履行责任。

**№8.个人和团队：**能够在应用物理及其交叉学科背景下的团队中承担个体、团队成员以及负责人的角色。

№8.1 具有团队意识，能在交叉学科背景下与其他成员有效沟通，合作共事。

№8.2 能正确对待作为个体、团队成员和负责人的角色，既能够在团队中独立或合作开展工作，有能够组织、协调和指挥团队开展工作。

**№9.沟通：**能够就应用物理复杂科学和工程问题与业界同行及社会公众进行有效沟通和交流，包括撰写报告和设计文稿、陈述发言、清晰表达或回应指令，并具备一定的国际视野，能够在跨文化背景下进行沟通和交流。

№9.1 能就应用物理专业问题，以口头、文稿、图表等方式，准确表达自己的观点，回应质疑，理解与业界同行和社会公众交流的差异性。

№9.2 了解应用物理专业领域的国际发展趋势、研究热点，理解和尊重世界不同文化的差异性和多样性。

№9.3 具备跨文化交流的语言和书面表达能力，能就应用物理专业问题，在跨文化背景下进行基本沟通和交流。

**№10.终身学习：**具有自主学习和终身学习的意识，有不断学习和适应发展的能力。

№10.1 具有良好的身体素质和心理素质，正确的世界观、价值观和人生观，认同终身教育和持续教育理念，能在社会发展的大背景下，认识到自主学习和终身学习必要业性。

№10.2 具有自主学习的能力，自觉学习外语，能利用计算机、搜索引擎等现代信息技术跟踪并获取信息，具有适应应用物理专业领域新技术发展的能力，包括对新技术的理解能力、归纳总结能力和提出问题的能力。

**专业简介：**

华南理工大学应用物理学本科专业开办于1986年，1996年更名为应用物理（光电信息与应用），2003年经过学校批准恢复应用物理学专业招生。2017年应用物理学专业入选广东省高等学校重点专业。

本专业教师具有良好的师德师风，专业背景与科研方向涵盖物理学一级学科的凝聚态物理、理论物理、声学等三个方向，同时在物理电子学、材料物理与化学等方向布局。研究领域顺应物理学科的发展，具有特色鲜明、拓展性强等特点。

本专业现有1个本科专业实验室，实验室面积超过300平方，仪器设备总价值超过400万元。同时，应用物理学专业还包括声子晶体、高压物理和凝聚态物理实验平台等三个相关科研实验平台。

**专业特色：**

立足粤港澳大湾区，以“夯实物理基础、注重实践创新、加强理工融合、分类多元培养、面向国际前沿”的育人理念，为众多新工科方向输送“三创型”物理专业人才。

**授予学位：**

理学学士学位

**核心课程：**

基础物理、理论力学、数学物理方法、电动力学、热力学与统计物理、量子力学、固体物理、计算物理。

**特色课程：**

新生研讨课：物理学的进化、宇宙的演化

专题研讨课：新产业前沿及其物理基础

双语/全英课程：基础物理、数学物理方法、量子力学、固体物理、计算物理、材料物理

MOOC：计算物理

学科前沿课：新产业前沿及其物理基础

跨学科课程：大学化学、大学化学实验

本研共享课：固体理论II、高等量子力学、物理学进展、声学进展、凝聚态物理实验方法，广义相对论，原子核物理

校企合作课：毕业实习

创新实践课：研究与探索实践（“三个一”课程）

专题设计课：计算物理课程设计、固体物理课程设计

劳动教育课：毕业实习

**一、各类课程学分登记表**

**1.学分统计表**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 课程类别 | 课程要求 | 学分 | 学时 | 备注 |
| 公共基础课 | 必修 | 64 | 1324 |  |
| 通识 | 10 | 160 |  |
| 专业基础课 | 必修 | 42 | 752 |  |
| 选修课 | 选修 | 18 | 288 |  |
| 合计 | | 134 | 2524 |  |
| 集中实践教学环节（周） |  | 32 | 36周 |  |
| 毕业学分要求 | 166 | | | |

备注：毕业学分要求格式：合计学分+集中实践教学环节学分=毕业学分要求

**2.类别统计表**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 学时 | | | | | 学分 | | | | | | |
| 总学时数 | 其中 | | 其中 | | 总学分数 | 其中 | | 其中 | | | 其中 |
| 必修学时 | 选修学时 | 理论教学学时 | 实验教学学时 | 必修学分 | 选修学分 | 集中实践教学环节学分 | 理论教学学分 | 实验教学学分 | 创新创业教育学分 |
| 2524 | 2060 | 448 | 1926 | 598 | 166 | 148 | 18 | 32 | 115 | 19 | 4 |

注：

1.通识课计入选修一项中；

2.实验教学包括“专业教学计划表”中的实验、实习和其他；

3.创新创业教育学分：培养计划中的课程，由各学院教学指导委员会认定，包括竞教结合课程、创新实践课程、创业教育课程等学分；

4.必修学时＋选修学时=总学时数；理论教学学时＋实验教学学时=总学时数；必修学分＋选修学分=总学分数；集中实践教学环节学分＋理论教学学分＋实验教学学分=总学分数

**二、课程设置表**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **类别** | **课 程**  **代 码** | **课程名称** | | **是否必修** | **学时数** | | | | **学分数** | **开课**  **学期** | **毕业**  **要求** |
| **总学时** | **实验** | **实习** | **其他** |
| **公 共 基 础 课** | 031101371 | 中国近现代史纲要 | | 必  修  课 | 40 |  |  | 4 | 2.5 | 1 | №8 |
| 031101661 | 思想道德与法治 | | 40 |  |  | 4 | 2.5 | 2 | №8 |
| 031101522 | 马克思主义基本原理 | | 40 |  |  | 4 | 2.5 | 3 | №8 |
| 031101423 | 毛泽东思想和中国特色社会主义理论体系概论 | | 72 |  |  | 24 | 4.5 | 4 | №8 |
| 031101331 | 形势与政策 | | 128 |  |  |  | 2.0 | 1-8 | №8 |
| 044101382 | 学术英语（一） | 英语A班修读 | 48 |  |  |  | 3.0 | 1 | №10 |
| 044102453 | 学术英语（二） | 48 |  |  |  | 3.0 | 2 | №10 |
| 044103681 | 大学英语（一） | 英语B、C班修读 | 48 |  |  |  | 3.0 | 1 | №10 |
| 044103691 | 大学英语（二） | 48 |  |  |  | 3.0 | 2 | №10 |
| 045101644 | 大学计算机基础 | | 32 |  |  | 32 | 1.0 | 1 | №5 |
| 052100332 | 体育（一） | | 36 |  |  | 36 | 1.0 | 1 | №12 |
| 052100012 | 体育（二） | | 36 |  |  | 36 | 1.0 | 2 | №12 |
| 052100842 | 体育（三） | | 36 |  |  | 36 | 1.0 | 3 | №12 |
| 052100062 | 体育（四） | | 36 |  |  | 36 | 1.0 | 4 | №12 |
| 006100112 | 军事理论 | | 36 |  |  | 18 | 2.0 | 2 | №9 |
| 045100772 | C++程序设计基础 | | 40 |  |  | 8 | 2.0 | 1 | №2,5 |
| 074102992 | 工程制图 | | 48 |  |  |  | 3.0 | 1 | №2 ,5 |
| 040100051 | 微积分Ⅱ（一） | | 80 |  |  |  | 5.0 | 1 | №1,2 |
| 040100411 | 微积分Ⅱ（二） | | 80 |  |  |  | 5.0 | 2 | №1,2 |
| 040100401 | 线性代数与解析几何 | | 48 |  |  |  | 3.0 | 1 | №1,2 |
| 040100023 | 概率论与数理统计 | | 48 |  |  |  | 3.0 | 2 | №1,2 |
| [040100221](javascript:void(0);) | 数学实验 | | 64 | 64 |  |  | 2.0 | 4 | №1,4 |
| 041100952 | 基础物理（一） | | 48 |  |  |  | 3.0 | 1 | №1,2 |
| 041100382 | 基础物理（二） | | 64 |  |  |  | 4.0 | 2 | №1,2 |
| 041100172 | 基础物理（三） | | 48 |  |  |  | 3.0 | 3 | №1,2 |
| 041100161 | 基础物理实验（一） | | 32 | 32 |  |  | 1.0 | 2 | №1,2 |
| 041101482 | 基础物理实验（二） | | 48 | 48 |  |  | 1.5 | 3 | №1,2 |
| 041102281 | 基础物理实验（三） | | 48 | 48 |  |  | 1.5 | 4 | №1,2 |
|  | 人文科学领域、社会科学领域 | | 通  识  课 | 128 |  |  |  | 8.0 |  | №8 |
|  | 科学技术领域 | | 32 |  |  |  | 2.0 |  | №8 |
| **合计** | | | | 1484 | 192 |  | 238 | 74 |  |  |

备注：学时中其他可以为上机和实践学时

**二、课程设置表（续）**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **类别** | **课 程**  **代 码** | **课程名称** | **是否必修** | **学时数** | | | | **学分数** | **开课**  **学期** | **毕业**  **要求** |
| **总学时** | **实验** | **实习** | **其他** |
| **专业基础课** | 041100641 | 宇宙的演化 | 必 | 16 |  |  |  | 1.0 | 3 | №1 |
| 041101001 | 物理学的进化 | 必 | 16 |  |  |  | 1.0 | 1 | №1 |
| 041101731 | 光学前沿 | 必 | 16 |  |  |  | 1.0 | 2 | №2,5 |
| 041101141 | 理论力学Ⅲ | 必 | 64 |  |  |  | 4.0 | 3 | №1,2 |
| 041101891 | 数学物理方法 | 必 | 64 |  |  |  | 4.0 | 3 | №1,2 |
| 041100252 | 计算物理 | 必 | 64 |  |  | 24 | 3.5 | 3 | №1,2 |
| 041101441 | 原子物理 | 必 | 64 |  |  |  | 4.0 | 4 | №1,2 |
| 041102231 | 电动力学I | 必 | 64 |  |  |  | 4.0 | 4 | №1,2 |
| 041100151 | 近代物理实验 | 必 | 64 | 64 |  |  | 2.0 | 5 | №1,2 |
| 041101831 | 应用物理专业实验 | 必 | 64 | 64 |  |  | 2.0 | 7 | №3,4,5 |
| 041100471 | 量子力学 | 必 | 64 |  |  |  | 4.0 | 5 | №1,2 |
| 041101522 | 热力学与统计物理 | 必 | 48 |  |  |  | 3.0 | 5 | №1,2 |
| 041100331 | 固体物理 | 必 | 64 |  |  |  | 4.0 | 6 | №1,2 |
| 024100291 | 电路Ⅱ | 必 | 64 |  |  |  | 4.0 | 2 | №2,4 |
| 024100281 | 电路实验 | 必 | 16 | 16 |  |  | 0.5 | 3 | №2,4 |
| **合　计** | | 必 | 752 | 144 |  | 24 | 42 |  |  |
| **选修课** | 模块1：凝聚态物理模块 | | | | | | | | | |
| 041102251 | 固体理论II | 选 | 32 |  |  |  | 2.0 | 7 | №1,2,3 |
| 041100532 | 半导体物理与器件 | 选 | 48 |  |  |  | 3.0 | 6 | №2,3 |
| 041101262 | 材料物理 | 选 | 32 |  |  |  | 2.0 | 6 | №3,5 |
| 041102091 | 物理学进展 | 选 | 48 |  |  |  | 3.0 | 6 | №2,3 |
| 041102081 | 凝聚态物理实验方法 | 选 | 32 |  |  |  | 2.0 | 7 | №3,4,5 |
|  | 备注 | 本模块共计12个学分 | | | | | | | |
| 模块2：电子技术模块 | | | | | | | | | |
| 035100172 | 模拟电子技术II | 选 | 64 |  |  |  | 4.0 | 5 | №2,4 |
| 070100042 | 模拟电子技术实验 | 选 | 16 | 16 |  |  | 0.5 | 6 | №2,4 |
| 035100341 | 数字电子技术II | 选 | 64 |  |  |  | 4.0 | 6 | №2,4 |
| 035101342 | 数字电子技术实验 | 选 | 16 | 16 |  |  | 0.5 | 6 | №2,4 |
| 041101423 | 信号与系统 | 选 | 48 |  |  |  | 3.0 | 6 | №1,2 |
|  | 备注 | 本模块共计12个学分 | | | | | | | |
| 模块3：光电感知与通信模块 | | | | | | | | | |
| 041101423 | 信号与系统 | 选 | 48 |  |  |  | 3.0 | 4 | №1,2 |
| 041100483 | 数字信号处理 | 选 | 48 |  |  |  | 3.0 | 5 | №2,3 |
| 041101292 | 传感技术 | 选 | 32 |  |  |  | 2.0 | 5 | №3,4 |
| 041101911 | 光纤通信 | 选 | 48 |  |  |  | 3.0 | 6 | №3,4 |
| 041102061 | 物联网基础 | 选 | 32 |  |  |  | 2.0 | 6 | №3,4 |
|  | 备注 | 本模块共计13个学分 | | | | | | | |
| 公共选修课 | | | | | | | | | |
| 041101992 | 新产业前沿及其物理基础 | 选 | 32 |  |  |  | 2.0 | 5 |  |
| [037102783](javascript:void(0);) | 大学化学 | 选 | 32 |  |  |  | 2.0 | 3 | №2,3 |
| [037101943](javascript:void(0);) | 大学化学实验 | 选 | 16 | 16 |  |  | 0.5 | 4 | №3,4,5 |
| 041100421 | 理论声学 | 选 | 48 |  |  |  | 3.0 | 5 | №2,3 |
| 041102151 | 广义相对论 | 选 | 32 |  |  |  | 2.0 | 7 | №2,3 |
| 041102031 | 原子核物理 | 选 | 32 |  |  |  | 2.0 | 7 | №2,3 |
| 041102141 | 声学进展 | 选 | 32 |  |  |  | 2.0 | 6 | №2,3 |
| 041102131 | 高等量子力学 | 选 | 48 |  |  |  | 3.0 | 7 | №1,3,5 |
| 041102121 | 群论 | 选 | 48 |  |  |  | 3.0 | 6 | №1,2,3,5 |
| 020100051 | 创新研究训练 | 选 | 32 |  |  |  | 2.0 | 7 |  |
| 020100041 | 创新研究实践I | 选 | 32 |  |  |  | 2.0 | 7 |  |
| 020100031 | 创新研究实践II | 选 | 32 |  |  |  | 2.0 | 7 |  |
| 020100061 | 创业实践 | 选 | 32 |  |  |  | 2.0 | 7 |  |
| **合　计** | | 选 | 选修课修读最低要求18学分 | | | | | | |

备注：

1. 学时中其他可以为上机和实践学时。

**2. 总选修学分要求最低为18分。有三个选修模块：凝聚态物理模块、电类课程模块和光电感知与通信模块。学生选定某个模块后，必须选修这个模块内的所有课程，其余的学分再在公共选修课或其它模块中选修。**

3. 学生根据自己开展科研训练项目、学科竞赛、发表论文、获得专利和自主创业等情况申请折算为一定的专业选修课学分（创新研究训练、创新研究实践I、创新研究实践II、创业实践等创新创业课程）。每个学生累计申请为专业选修课总学分不超过4个学分。经学校批准认定为选修课学分的项目、竞赛等不再获得对应第二课堂的创新学分

**三、集中实践教学环节**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **课 程**  **代 码** | **课程名称** | **是否必修** | **学时数** | | **学分数** | **开课**  **学期** | **毕业要求** |
| **实践** | **授课** |
| 006100151 | 军事技能 | 必 | 2周 |  | 2.0 | 1 | №9 |
| 031101551 | 马克思主义理论与实践 | 必 | 2周 |  | 2.0 | 3 | №8 |
| 041102272 | 研究与探索实践 | 必 | 4周 |  | 4.0 | 7 | №3,5 |
| 030100702 | 工程训练Ⅰ | 必 | 2周 |  | 2.0 | 4 | №3,4 |
| 041100131 | 电子工艺实习II | 必 | 2周 |  | 2.0 | 5 | №3,4 |
| 041101671 | 计算物理课程设计 | 必 | 2周 |  | 2.0 | 4 | №3,4 |
| 041101881 | 固体物理课程设计 | 必 | 2周 |  | 2.0 | 6 | №3,4 |
| 041100561 | 毕业实习 | 必 | 4周 |  | 4.0 | 8 | №5 |
| 041100554 | 毕业设计 | 必 | 16周 |  | 12.0 | 7, 8 | №3,4,5 |
| **合　计** | | 必 | 36周 |  | 32.0 |  |  |

**四、第二课堂**

第二课堂由人文素质教育和创新能力培养两部分组成。

**1.人文素质教育基本要求**

学生在取得专业教学计划规定学分的同时，还应结合自己的兴趣适当参加课外人文素质教育活动，参加活动的学分累计不少于3个学分。其中，大学体育教学团队开设课外体育课程，高年级本科生必修，72学时，1学分，纳入第二课堂人文素质教育学分。

**2.创新能力培养基本要求**

学生在取得本专业教学计划规定学分的同时，还必须参加国家创新创业训练计划、广东省创新创业训练计划、SRP（学生研究计划）、百步梯攀登计划或一定时间的各类课外创新能力培养活动（如学科竞赛、学术讲座等），参加活动的学分累计不少于4个学分。

**Applied Physics**

**Program Code: 070202 Duration：4 years**

**Educational Objectives:**

We will cultivate “Three abilities” (learning ability, ideological ability, action ability) and "Three creations" (innovation, creation, entrepreneurship) undergraduate talents that have a "Family-country" emotion and a global vision and develop morality, intelligence, physique, aesthetics, and labor in an all-round way. Students are trained to have physical foundation and know frontiers of physics, to possess good scientific perception and good ability in research, development and management, to have innovation and entrepreneurship mind, to have competition and cooperation spirit, to become compound and creative talents that are qualified for research, teaching, technical development and management in physics and related fields.

**Student Outcomes:**

**№1. Fundamental Knowledge**: An ability to apply knowledge of mathematics, natural science, physics fundamentals and other specializations to the solution of complex problems in applied physics.

№1.1 An ability to apply knowledge of mathematics, natural science, physics fundamentals and other specializations to the solution of complex problems in applied physics.

№1.2 An ability to apply languages of mathematics, natural science and physics fundamentals to the expressions of complex problems in applied physics, and mathematical models can be established and solved for specific objects in complex problems in applied physics.

№1.3 An ability to use relevant knowledge and mathematical models to derive and analyze complex problems in applied physics.

№1.4 An ability to apply relevant knowledge and mathematical methods to compare and synthesize solutions to complex problems in applied physics.

**№2. Problem Analysis:** An ability to identify, formulate and analyze complex applied physics problems, reaching to substantiated conclusions using basic principles of mathematics, science, and physics.

№2.1 An ability to correctly express complex problems in applied physics based on relevant scientific principles and mathematical methods.

№2.2 An ability to analyze and demonstrate specific problems in physic by combing basic principles and relevant literatures, as well as proposing possible solutions and recognize the diversity of them.

№2.3 An ability to apply basic principles and literature research to analyze the influencing factors in applied physics and attain effective conclusions.

**№3. Research:** An ability to conduct investigations of complex physical problems based on scientific theories and adopting scientific methods including design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions.

№3.1 An ability to investigate and analyze complex problems aiming at the applied physics with the basic principles of natural science and professionalism through literature research and related methods.

№3.2 An ability to choose research route and design the using plans according to the requirements in complex problems in applied physics.

№3.3 An ability to construct experimental systems according to the experimental plan and safely carry out the experiments and correctly collect the experimental data aiming at the complex problems of physics.

№3.4 An ability to analyze and explain the experimental results and obtain reasonable and effective conclusions through information synthesis.

**№4. Appling Modern Tools:** An ability to create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex engineering activities, with an understanding of the limitations.

№4.1 Understanding the principles and methods of modern instruments, engineering and IT tools, and simulation software commonly used in applied physics, with an understanding of their limitations.

№4.2 An ability to choose and use appropriate instruments, information, engineering tools and simulation software to analyze, compute and design complex problems in applied physics.

№4.3 An ability to develop or select modern tools that meet specific needs for specific objects of applied physics, as well as simulate and predict professional problems, and analyze its limitations.

**№5. Engineering and Society:** An ability to apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.

№5.1 Fully understand the crucial role of applied physics in technological progress and social development, know the technical standard system, intellectual property rights, industrial polices and laws in related fields of applied physics, understanding the impact of different social cultures on scientific activities.

№5.2 An ability to analyze and evaluate the impact of science on society, health, safety, law, and culture, as well as the impact of these constrains on project implementation through experiments, practice and internships in applied physics, so well as understand and clarify the responsibilities and obligations that should be undertaken.

**№6. Environment and Sustainable Development:** An ability to understand and evaluate the impact of professional physical solutions in environmental and societal contexts and demonstrate knowledge of and need for sustainable development.

№6.1 Understand the concept and connection of environmental protection and sustainable development.

№6.2 Can fully understand the damage and hidden dangers that may be caused to humans and the environment in the practice of applied physics, fully consider and evaluate environmental impact factors when formulating complex problem solutions, and be able to self-discipline from the perspective of environmental protection and sustainable development.

**№7. Professional Standards:** Have an understanding of humanity and social science literacy, being able to understand and abide by professional ethics and standards responsibly in physical practice.

№7.1 Have an understanding of humanity and social science literacy and a firm belief in socialism and a sense of social responsibility, have correct values, understand the relationship between individuals and society, and know China’s national conditions.

№7.2 Understand the scientific professional ethics and norms of honesty, fairness and integrity, and be able to consciously abide by them in scientific practice.

№7.3 Understand the social responsibilities of scientists for the safety, health and well-being of the public, and the environmental protection, and be able to judge and evaluate the social responsibilities of practical activities in the field of applied physics, and consciously fulfill their responsibilities.

**№8. Individual and Teams:** An ability to function effectively as an individual, and as a member or leader in diverse teams and in interdisciplinary contexts.

№8.1 Have a sense of teamwork and be able to communicate effectively with others and work together in interdisciplinary contexts.

№8.2 Be able to treat the role of individuals, team members and leaders correctly, be able to work independently or cooperatively in a team, and be able to organize, coordinate and direct the team work.

**№9. Communication:** An ability to communicate effectively on complex physical problems with the physics community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, give and receive clear instructions, and communicate in cross-cultural contexts with international perspective.

№9.1 Be able to accurately express one’s own views, respond to queries and understand the differences in communication with peers and the public in terms of oral, manuscripts, diagrams, etc. on applied physics professional issues.

№9.2 Understand the international development trends and research hotspots in the field of applied physics, understand and respect the differences and diversity of different cultures in the world.

№9.3 Have the language and written expression skills for cross-cultural communication, and can communicate with each other in a cross-cultural context on professional issues in applied physics.

**№10. Lifelong Learning:** A recognition of the need for, and an ability to engage in independent and life-long learning with the ability to learn continuously and adapt to new developments.

№10.1 Have a good physical and psychological qualities, a correct world outlook, values and outlook on life, agree with the concepts of lifelong education and continuous education, and be able to recognize the necessity of independent learning and lifelong learning in the context of social development.

№10.2 An ability to learn independently, to learn foreign languages consciously, to track and obtain information using modern technologies such as computers and search engines, and to adapt to the development of new technologies in the field of applied physics, including the ability to understand new technologies, the ability to summarize and propose new questions.

**Program Profile：**

The Applied Physics undergraduate program was founded in 1986. It was renamed as Applied Physics (Optical Information Science and Technology) in 1996. It was restored as Applied Physics in 2003 under the approval of the university. The Applied Physics undergraduate program is selected as one of the emphasized programs in universities by the Guangdong Province in 2017.

Teachers in our program have good teacher’s morality, and have background and research directions covering condensed matter physics, theoretical physics, and acoustics, as well as physical electronics, materials physics and chemistry. Our research fields follow the development of physics, and have distinctive features and strong expansion.

Our program has an undergraduate major lab with an area bigger than 300 square meter, and the instruments and equipment have a value larger than 4 million yuan. Furthermore, we have three related labs in acoustic crystal, high pressure physics, and condensed matter physics. We also have supports from IOP of CAS and CSNS for both teachers and instruments.

**Program Features:**

Standing on the “Guangdong-HongKong-Macao” Great Bay Area and with the features of “Consolidating **the physical foundation, focusing on practical innovation, enhancing science and technology fusion,** cultivating with multiple categories, facing international frontiers”, and educate “Three Creation” physics talents for multiple new engineering majors.

**Degree Conferred:**

Bachelor of Natural Science

**Core Courses:**

Fundamental of Physics, Theoretical Mechanics, Mathematical Methods for Physicists, Electrodynamics, Thermodynamics and Statistical Physics, Quantum Mechanics, Solid State Physics, Computational Physics.

**Featured Courses:**

Freshmen Seminars: Evolution of Physics, Evolution of the Universe

Special Topics: Frontier and physics of emerging industry

Bilingual Courses: Fundamental of Physics, Mathematical Methods for Physicists, Quantum Mechanics, Solid State Physics, Computational Physics, Materials Physics

Courses Taught in English:

MOOC: Computational Physics.

Subject Frontiers Courses: Frontier and physics of emerging industry

Interdisciplinary Courses: University Chemistry, University Chemistry Experiment

Baccalaureate-Master’s Integrated Courses: Solid State Theory II, Advanced Quantum Mechanics, Advances in physics, Advances in Acoustics, Experiment Methods in Condensed Matter Physics, General Relativity and Astrophysics, Nuclear Physics

Cooperative Courses with Enterprises: Manufactural Practice, Practice on Diploma Project

Contest-Teaching Integrated Courses:

Innovation Practice: Innovation Research Training, Innovation Research Practice I, Innovation Research Practice II, Research and Discovery Practice

Entrepreneurship Courses: Entrepreneurial Practice

Workshops:

Special Designs:Course Design for Computational Physics, Course Design of Solid State Physics

**1. Registration Form of Curriculum Credits**

**1.1 Credits Registration Form**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Course Category | Requirement | Credits | Academic Hours | Remarks |
| General Basic Courses | Compulsory | 64 | 1324 |  |
| General Education | 10 | 160 |  |
| Specialty Basic Courses | Compulsory | 42 | 752 |  |
| Elective Courses | Elective | 18 | 288 |  |
| Total | | 134 | 2524 |  |
| Practice Training (Weeks) |  | 32 | 36 weeks |  |
| Credits Required for Graduation | 166 | | | |

**1.2 Category Registration Form**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Academic Hours | | | | | Credits | | | | | | |
| Total | Include | | Include | | Total | Include | | Include | | | Include |
| Compulsory | Elective | Theory Course | Lab | Compulsory | Elective | Practice-concentrated Training | Theory Course Credits | Lab | Innovation and Entrepreneurship Education |
| 2542 | 2060 | 448 | 1926 | 598 | 166 | 148 | 18 | 32 | 1115 | 19 | 4 |

**2. Courses Schedule**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Course Category | Course No. | Course Title | | C/E | Total Curriculum Hours | | | | Credits | Semester | Student Outcomes |
| Class Hours | Lab Hours | Practice Hours | Other Hours |
| **General Basic Courses** | 031101371 | Skeleton of Chinese Modern History | | C | 40 |  |  | 4 | 2.5 | 1 | №8 |
| 031101661 | Cultivation of Thought and Morals & Fundamental of Law | | 40 |  |  | 4 | 2.5 | 2 | №8 |
| 031101522 | Fundamentals of Marxism Principle | | 40 |  |  | 4 | 2.5 | 3 | №8 |
| 031101423 | Thought of Mao ZeDong and Theory of Socialism with Chinese Characteristics | | 72 |  |  | 24 | 4.5 | 4 | №8 |
| 031101331 | Analysis of the Situation & Policy | | 128 |  |  |  | 2.0 | 1-8 | №8 |
| 044101382 | English for Academic Purposes (1) | for English Class A | 48 |  |  |  | 3.0 | 1 | №10 |
| 044102453 | English for Academic Purposes (2) | 48 |  |  |  | 3.0 | 2 | №10 |
| 044103681 | College English (1) | for English Class B、C | 48 |  |  |  | 3.0 | 1 | №10 |
| 044103691 | College English (2) | 48 |  |  |  | 3.0 | 2 | №10 |
| 045101644 | Foundations of Computer | | 32 |  |  | 32 | 1.0 | 1 | №5 |
| 052100332 | Physical Education (1) | | 36 |  |  | 36 | 1.0 | 1 | №12 |
| 052100012 | Physical Education (2) | | 36 |  |  | 36 | 1.0 | 2 | №12 |
| 052100842 | Physical Education (3) | | 36 |  |  | 36 | 1.0 | 3 | №12 |
| 052100062 | Physical Education (4) | | 36 |  |  | 36 | 1.0 | 4 | №12 |
| 006100112 | Military Principle | | 36 |  |  | 18 | 2.0 | 2 | №9 |
| 045100772 | C++ Programming Foundations | | 40 |  |  | 8 | 2.0 | 1 | №2,5 |
| 074102992 | Engineering Drawing | | 48 |  |  |  | 3.0 | 1 | №2 ,5 |
| 040100051 | Calculus(1) | | 80 |  |  |  | 5.0 | 1 | №1,2 |
| 040100411 | Calculus(2) | | 80 |  |  |  | 5.0 | 2 | №1,2 |
| 040100401 | Linear Algebra & Analytic Geometry | | 48 |  |  |  | 3.0 | 1 | №1,2 |
| 040100023 | Probability & Mathematical Statistics | | 48 |  |  |  | 3.0 | 2 | №1,2 |
| [040100221](javascript:void(0);) | Mathematical Experiment | | 48 | 48 |  |  | 2.0 | 4 | №1,4 |
| 041100952 | Fundamental of Physics(1) | | 48 |  |  |  | 3.0 | 1 | №1,2 |
| 041100382 | Fundamental of Physics(2) | | 64 |  |  |  | 4.0 | 2 | №1,2 |
| 041100172 | Fundamental of Physics(3) | | 48 |  |  |  | 3.0 | 3 | №1,2 |
| 041100161 | Experiment of Fundamental Physics I | | 32 | 32 |  |  | 1.0 | 2 | №1,2 |
| 041101482 | Experiment of Fundamental Physics II | | 48 | 48 |  |  | 1.5 | 3 | №1,2 |
| 041102281 | Experiment of Fundamental Physics III | | 48 | 48 |  |  | 1.5 | 4 | №1,2 |
|  | Humanities, Social Science | | E | 128 |  |  |  | 8.0 |  | №8 |
|  | Science and Technology | | 32 |  |  |  | 2.0 |  | №8 |
| **Total** | | | | 1468 | 176 |  | 238 | 74 |  |  |

**2. Courses Schedule**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Course Category | Course No. | Course Title | C/E | Total Curriculum Hours | | | | Credits | Semester | Student Outcomes |
| Class Hours | Lab Hours | Practice Hours | Other Hours |
| **Specialty Basic Courses** | 041100641 | Evolution of the Universe | C | 16 |  |  |  | 1.0 | 3 | №1 |
| 041101001 | Evolution of Physics | C | 16 |  |  |  | 1.0 | 1 | №1 |
| 041101731 | Frontiers in Optics | C | 16 |  |  |  | 1.0 | 2 | №2,5 |
| 041101141 | Theoretical Mechanics | C | 64 |  |  |  | 4.0 | 3 | №1,2 |
| 041101891 | Mathematical Methods for Physicists | C | 64 |  |  |  | 4.0 | 3 | №1,2 |
| 041100252 | Computational Physics | C | 64 |  |  | 24 | 3.5 | 3 | №1,2 |
| 041101441 | Atomic Physics | C | 64 |  |  |  | 4.0 | 4 | №1,2 |
| 041102231 | Electrodynamics I | C | 64 |  |  |  | 4.0 | 4 | №1,2 |
| 041100151 | Modern Physical Experiment | C | 64 | 64 |  |  | 2.0 | 5 | №1,2 |
| 041101831 | Special Experiments for Applied Physics | C | 64 | 64 |  |  | 2.0 | 7 | №3,4,5 |
| 041100471 | Quantum Mechanics | C | 64 |  |  |  | 4.0 | 5 | №1,2 |
| 041101522 | Thermodynamics and Statistical Physics | C | 48 |  |  |  | 3.0 | 5 | №1,2 |
| 041100331 | Solid State Physics | C | 64 |  |  |  | 4.0 | 6 | №1,2 |
| 024100291 | Electric Circuits II | C | 64 |  |  |  | 4.0 | 2 | №2,4 |
| 024100281 | Experiment of Circuit | C | 16 | 16 |  |  | 0.5 | 3 | №2,4 |
| **Total** | | C | 752 | 144 |  | 24 | 42 |  |  |
| **Elective Courses** | Module No 1: Condensed Matter Physics Module | | | | | | | | | |
| 041102251 | Solid State Theory II | E | 32 |  |  |  | 2.0 | 7 | №1,2,3 |
| 041100532 | Semiconductor Physics and Devices | E | 48 |  |  |  | 3.0 | 6 | №2,3 |
| 041101262 | Materials Physics | E | 32 |  |  |  | 2.0 | 6 | №3,5 |
| 041102091 | Advances in physics | E | 48 |  |  |  | 3.0 | 6 | №2,3 |
| 041102081 | Experiment Methods in Condensed Matter Physics | E | 32 |  |  |  | 2.0 | 7 | №3,4,5 |
|  | Remarks | Module total credits: 12 | | | | | | | |
| Module No. 2: Electric Technology | | | | | | | | | |
| 035100172 | Analog Electronics | E | 64 |  |  |  | 4.0 | 5 | №2,4 |
| 070100042 | Experiment of Analog Electronics | E | 16 | 16 |  |  | 0.5 | 6 | №2,4 |
| 035100341 | Digital Electronics | E | 64 |  |  |  | 4.0 | 6 | №2,4 |
| 035101342 | Experiment of Digital Electronics | E | 16 | 16 |  |  | 0.5 | 6 | №2,4 |
| 041101423 | Signals and systems | E | 48 |  |  |  | 3.0 | 6 | №1,2 |
|  | Remarks | Module total credits: 12 | | | | | | | |
| Module No. 3: Optoelectronics Perception and Communication | | | | | | | | | |
| 041101423 | Signals and Systems | E | 48 |  |  |  | 3.0 | 4 | №1,2 |
| 041100483 | Digital Signal Processing | E | 48 |  |  |  | 3.0 | 5 | №2,3 |
| 041101292 | Sensor Technology | E | 32 |  |  |  | 2.0 | 5 | №3,4 |
| 041101911 | Optical Fiber Communications | E | 48 |  |  |  | 3.0 | 6 | №3,4 |
| 041102061 | Fundamentals of Internet of Things | E | 32 |  |  |  | 2.0 | 6 | №3,4 |
|  | Remarks | Module total credits: 13 | | | | | | | |
| General Education of Physics | | | | | | | | | |
| 041101992 | Frontier of new Industry and Its Physical Foundation | E | 32 |  |  |  | 2.0 | 5 |  |
| [037102783](javascript:void(0);) | University Chemistry | E | 32 |  |  |  | 2.0 | 3 | №2,3 |
| [037101943](javascript:void(0);) | University Chemistry Experiment | E | 16 | 16 |  |  | 0.5 | 4 | №3,4,5 |
| 041100421 | Theoretical Acoustics | E | 48 |  |  |  | 3.0 | 5 | №2,3 |
| 041102151 | General Relativity | E | 32 |  |  |  | 2.0 | 7 | №2,3 |
| 041102031 | Nuclear Physics | E | 32 |  |  |  | 2.0 | 7 | №2,3 |
| 041102141 | Advances in Acoustics | E | 32 |  |  |  | 2.0 | 6 | №2,3 |
| 041102131 | Advanced Quantum Mechanics | E | 48 |  |  |  | 3.0 | 7 | №1,3,5 |
| 041102121 | Group Theory | E | 48 |  |  |  | 3.0 | 6 | №1,2,3,5 |
| 020100051 | Innovation Research Training | E | 32 |  |  |  | 2.0 | 7 |  |
| 020100041 | Innovation Research Practice I | E | 32 |  |  |  | 2.0 | 7 |  |
| 020100031 | Innovation Research Practice II | E | 32 |  |  |  | 2.0 | 7 |  |
| 020100061 | Entrepreneurial Practice | E | 32 |  |  |  | 2.0 | 7 |  |
| **Total** | | E | Minimum elective course credits required: 18 | | | | | | |

**3. Practice-concentrated Training**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Course No | Course Title | C/E | Total Curriculum Hours | | Credits | Semester | Student Outcomes |
| Practice  weeks | Lecture Hours |
| 006100151 | Military Training | C | 2 weeks |  | 2.0 | 1 | №9 |
| 031101551 | Marxism Theory and Practice | C | 2 weeks |  | 2.0 | 3 | №8 |
| 041102272 | Research and Discovery Practice | C | 4 weeks |  | 4.0 | 7 | №3,5 |
| 030100702 | Engineering Training I | C | 2 weeks |  | 2.0 | 4 | №3,4 |
| 041100131 | Exercitation of Electronic TechnologyⅡ | C | 2 weeks |  | 2.0 | 5 | №3,4 |
| 041101671 | Course Design for Computational Physics | C | 2 weeks |  | 2.0 | 4 | №3,4 |
| 041101881 | Course Design of Solid State Physics | C | 2 weeks |  | 2.0 | 6 | №3,4 |
| 041100561 | Practice on Diploma Project（containing labor course 32 ac. hrs） | C | 4 weeks |  | 4.0 | 8 | №5 |
| 041100554 | Diploma Project | C | 16 weeks |  | 12.0 | 7, 8 | №3,4,5 |
| **Total** | | C | 36 weeks |  |  |  |  |

**4.“Second Classroom” Activities**

“Second Classroom” Activities are comprised of two parts, Humanities Quality Education and Innovative Ability Cultivation.

1) Basic Requirements of Humanities Quality Education

Besides gaining course credits listed in one’s subject teaching curriculum, a student is required to participate in extracurricular activities of Humanities Quality Education based on one’s interest, acquiring no less than three credits. The advanced undergraduates must complete one of courses of Humanities Quality Education which has 72 class hours (it's equivalent to one credit which belongs to Humanities Quality Education Credit of Extracurricular Class) offered by the College Physical Education Teaching Group.

2) Basic Requirements of Innovative Ability Cultivation

Besides gaining course credits listed in one’s subject teaching curriculum, a student is required to participate in any one of the following activities: National Undergraduate Training Programs for Innovation and Entrepreneurship, Guangdong Undergraduate Training Programs for Innovation and Entrepreneurship, Student Research Program (SRP), One-hundred-steps Innovative Program, or any other extracurricular activities of Innovative Ability Cultivation that last a certain period of time (e.g. subject contests, academic lectures), acquiring no less than four credits.

**光电信息科学与工程(光电信息)**

**Opto-electronics Information Science and Engineering**

**(Optoelectronic Information)**

**专业代码：080705 学 制： 4年**

**培养目标：**

本专业以党的教育方针为准绳，以立德树人为导向，立足于国家战略新兴产业及粤港澳大湾区光电信息产业集群的重大战略需求，培养家国情怀和全球视野兼备，“三力”（学习力、思想力、行动力）卓越、德智体美劳全面发展，具备扎实的数理基础，具有良好的光电信息科学与工程专业中光电技术、光电感知与通信领域的理论基础和实践能力，能不断适应技术进步和社会的变化需求，具备优秀的人文素养、创新意识、团队合作精神和国际化视野，能够从事并引领光电技术、光电感知与通信领域复杂工程问题的研究、开发和管理工作，具有学习力、思想力和行动力的高素质“三创型”（创新、创造、创业）人才。

本专业的毕业生培养目标分解为下列 3 个子目标。

培养目标 1（工程能力）：能够推动光电信息科学与工程专业的前沿技术发展，具备突出的工程创新意识，能灵活运用现代工具和相关技术从事光电技术、光电感知与通信等领域的研究、开发和管理工作。

培养目标 2（工程素养）：具备优良的专业素养和突出的创新能力，能够不断适应国际、国内新形势下光电信息科学与工程专业的现代技术发展，熟练掌握并应用相关的科学理论和专业知识，能够作为团队或项目负责人、技术或管理骨干对光电技术、光电感知与通信等领域的复杂工程问题开展创新性、系统性研发工作。

培养目标 3（发展能力）：具有优秀的道德修养，富有科学素养、人文素质、创新意识、法制观念、合作精神、国际视野和社会责任感，具有终身学习和适应发展的能力。

**毕业要求：**

**№1.工程知识：**能够将数学、自然科学、工程基础和专业知识用于解决光电信息科学与工程复杂问题。

№1.1 具备解决光电信息科学与工程复杂问题所需的数学、自然科学、工程基础和专业知识。

№1.2 能将数学、自然科学、工程科学的语言工具用于光电信息科学与工程复杂问题的表述，能够针对光电信息科学与工程复杂问题中的具体对象建立数学模型并求解。

№1.3 能够将相关知识和数学模型用于推演、分析光电信息科学与工程复杂问题。

№1.4 能够将相关知识和数学模型方法用于光电信息科学与工程复杂问题解决方案的比较与综合。

**№2.问题分析：**能够应用数学、自然科学和工程科学的基本原理，识别、表达、并通过文献研究分析光电信息科学与工程复杂工程问题，以获得有效结论。

№2.1 能够基于数学、自然科学和工程科学的基本原理分析、识别和判断影响光电信息产品性能和质量的关键因素。

№2.2 能基于相关科学原理和数学模型方法正确表达光电信息科学与工程应用中的复杂工程问题。

№2.3 针对光电信息科学与工程应用中的复杂问题，能结合基本原理和文献研究进行分析论证，提出可能的解决方案，并认识到解决方案的多样性。

№2.4 能运用专业基本原理，借助文献研究，分析光电信息科学与工程应用中的影响因素，并获得有效结论。

**№3.设计/开发解决方案：**能够设计针对光电信息工程复杂问题的解决方案，设计满足特定需求的系统、单元（部件）或工艺流程，并能够在设计环节中体现创新意识，考虑社会、健康、安全、法律、文化以及环境等因素。

№3.1 针对光电信息产品设计中的复杂工程问题，能掌握工程设计和产品开发全周期、全流程的基本设计开发方法和技术，了解影响设计目标和技术方案的各种因素。

№3.2 能够针对光电信息产品制造的特定工况、特定性能要求，完成单元设计。

№3.3 能够进行光电信息产品系统或工艺流程设计，在设计中体现创新意识。

№3.4 在光电信息产品设计中能够考虑安全、健康、法律、文化和环境等制约因素，主动规避可能的负面作用。

**№4.研究：**能够基于科学原理并采用科学方法对光电信息科学与工程复杂问题进行研究，包括设计实验、分析与解释数据、并通过信息综合得到合理有效的结论。

№4.1 针对光电信息产品设计、开发、制造与应用中的复杂工程问题，能基于自然科学和专业基本原理，通过文献研究和相关方法，调研和分析复杂工程问题的解决方案。

№4.2 针对光电信息产品设计、开发、制造与应用中的复杂工程问题，能根据要求选择研究路线，设计使用方案。

№4.3 针对光电信息产品设计、开发、制造与应用中的复杂工程问题，能够根据实验方案构建实验系统，安全地开展实验，正确地采集实验数据。

№4.4 能对实验结果进行分析和解释，并通过信息综合得到合理有效的结论。

**№5.使用现代工具：**能够针对光电信息产品设计、开发、制造与应用中的复杂工程问题，开发、选择与使用恰当的技术、资源、现代工程工具和信息技术工具，包括对复杂科学或工程问题的预测与模拟，并能够理解其局限性。

№5.1 了解光电信息科学与工程专业常用的现代仪器、信息技术工具、工程工具和模拟软件的使用原理和方法，并理解其局限性。

№5.2 能够选择与使用恰当的仪器、信息资源、工程工具和专业模拟软件，对光电信息科学与工程复杂问题进行分析、计算与设计。

№5.3 能够针对光电信息科学与工程具体对象，开发或选用满足特定需求的现代工具，模拟和预测专业问题，能够分析其局限性。

**№6.工程与社会：**能够基于工程相关背景知识进行合理分析，评价光电信息产品设计、开发、制造与应用中的工程实践和复杂工程问题解决方案对社会、健康、安全、法律以及文化的影响，并理解应承担的责任。

№6.1 充分认识光电信息科学在技术进步和社会发展中的重要地位和作用，了解光电信息专业相关领域的技术标准体系、知识产权、产业政策和法律法规，理解不同社会文化对工程活动的影响。

№6.2 通过光电信息产品设计、开发、制造与应用的实验、实践和实习等，能分析和评价工程实践对社会、健康、安全、法律及文化的影响，以及这些制约因素对项目实施的影响，并理解和明确应承担的责任和义务。

**№7.环境和可持续发展：**能够理解和评价针对光电信息产品设计、开发、制造和应用中复杂工程问题的专业工程实践对环境、社会可持续发展的影响。

№7.1 知晓和理解环境保护和可持续发展的理念和内涵。

№7.2 能充分认识光电信息生产实践过程中可能对人类和环境造成的损害和隐患，在制定复杂工程问题解决方案时能充分考虑并评价环境影响因素，能站在环境保护和可持续发展的角度进行自我约束。

**№8.职业规范：**具有人文社会科学素养、社会责任感，能够在光电信息工程实践中理解并遵守工程职业道德和规范，履行责任。

№8.1 具有人文社会科学素养、坚定的社会主义信念和社会责任感，有正确的价值观，理解个人与社会的关系，了解中国国情。

№8.2 理解诚实公正、诚信守则的工程职业道德和规范，并能在工程实践中自觉遵守。

№8.3 理解工程师对公众的安全、健康和福祉以及环境保护的社会责任，能对光电信息科学与工程领域实践活动的社会责任进行判断和评鉴，并自觉履行责任。

**№9.个人和团队：**能够在光电信息及其交叉学科背景下的团队中承担个体、团队成员以及负责人的角色。

№9.1 具有团队意识，能在交叉学科背景下与其他成员有效沟通，合作共事。

№9.2 能正确对待作为个体、团队成员和负责人的角色，既能够在团队中独立或合作开展工作，有能够组织、协调和指挥团队开展工作。

**№10.沟通：**能够就光电信息产品设计、开发、制造和应用中复杂科学和工程问题与业界同行及社会公众进行有效沟通和交流，包括撰写报告和设计文稿、陈述发言、清晰表达或回应指令，并具备一定的国际视野，能够在跨文化背景下进行沟通和交流。

№10.1 能就光电信息科学与工程专业问题，以口头、文稿、图表等方式，准确表达自己的观点，回应质疑，理解与业界同行和社会公众交流的差异性。

№10.2 了解光电信息科学与工程专业领域的国际发展趋势、研究热点，理解和尊重世界不同文化的差异性和多样性。

№10.3 具备跨文化交流的语言和书面表达能力，能就光电信息科学与工程专业问题，在跨文化背景下进行基本沟通和交流。

**№11.项目管理：**理解并掌握光电信息工程管理原理与经济决策方法，并能在多学科环境中应用。

№11.1 掌握光电信息工程项目中涉及的管理与经济决策方法。

№11.2 了解光电信息工程及产品全周期、全流程的成本构成，理解其中涉及的工程管理与经济决策问题。

№11.3 能根据市场、用户需求及技术发展的变化，在多学科环境中，在设计开发解决方案过程中，运用工程管理与经济决策方法进行可行性分析。

**№12.终身学习：**具有自主学习和终身学习的意识，有不断学习和适应发展的能力。

№12.1 具有良好的身体素质和心理素质，正确的世界观、价值观和人生观，认同终身教育和持续教育理念，能在社会发展的大背景下，认识到自主学习和终身学习必要业性。

№12.2 具有自主学习的能力，自觉学习外语， 能利用计算机、搜索引擎等现代信息技术跟踪并获取信息，具有适应光电信息科学与工程领域新技术发展的能力，包括对新技术的理解能力、归纳总结能力和提出问题的能力。

**专业简介：**

华南理工大学光电信息科学与工程(光电信息)本科专业开办于2002年，依托于物理学一级学科，原专业名称为“光信息科学与技术”，2013年更改为现名。

本专业教师具有良好的师德师风，专业背景与科研方向涵盖光学和物理电子学等两个方向。现有专任教师23人，其中教授10人, 副教授9人, 中级职称教师4人, 包括2名国家杰出青年基金获得者。本专业现有1个“广东高校半导体照明工程研究中心”(省级工程研究中心)，一个本科专业实验室，实验室总面积达600平方米，同时还包括声子晶体、人工微结构光学实验平台等相关科研实验平台。在专业定位上，立足于培养光电信息科学基础扎实、具有国际视野，能在光电技术、光电感知与通信等领域的创新复合型高级专门人才。

**专业特色：**

以理促工、理工结合；强化国际化教育，拓展学生的国际视野；注重培养学生的研究、实践能力和创新创业潜能；使学生在光电信息学科具有扎实的基础和宽口径就业的优势。

**授予学位：**工学学士学位

**核心课程：**光学、电动力学、信息论基础、工程光学、量子力学、光电子学基础、激光物理与技术、固体物理

**特色课程：**

新生研讨课：物理学的进化、光学前沿

双语/全英课程：基础物理(1)、基础物理(2)、光学、固体物理、信号与系统、光电技术、通信原理、虚拟现实与增强现实技术导论、数字信号处理、光纤通信、数字图像处理、波分复用通信技术、计算机通信网

学科前沿课：新产业前沿及其物理基础

校企合作课：毕业实习

创新实践课：光电项目实践

创业教育课：光电信息与创业（“三个一”课程）

专题设计课：工程光学课程设计, 光电技术课程设计, 光电感知与通信课程设计, 固体物理课程设计

劳动教育课：毕业实习

**一、各类课程学分登记表**

**1.学分统计表**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 课程类别 | 课程要求 | 学分 | 学时 | 备注 |
| 公共基础课 | 必修 | 61 | 1212 |  |
| 通识 | 10 | 160 |  |
| 专业基础课 | 必修 | 48 | 864 |  |
| 选修课 | 选修 | 20 | 320 |  |
| 合计 | | 139 | 2556 |  |
| 集中实践教学环节（周） | 必修 | 31 | 35周 |  |
| 毕业学分要求 | 170 | | | |

备注：毕业学分要求格式：合计学分+集中实践教学环节学分=毕业学分要求

**2.类别统计表**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 学时 | | | | | 学分 | | | | | | |
| 总学时数 | 其中 | | 其中 | | 总学分数 | 其中 | | 其中 | | | 其中 |
| 必修学时 | 选修学时 | 理论教学学时 | 实验教学学时 | 必修学分 | 选修学分 | 集中实践教学环节学分 | 理论教学学分 | 实验教学学分 | 创新创业教育学分 |
| 2556 | 2076 | 480 | 2062 | 494 | 170 | 140 | 30 | 31 | 120 | 19 | 4 |

注：

1.通识课计入选修一项中；

2.实验教学包括“专业教学计划表”中的实验、实习和其他；

3.创新创业教育学分：培养计划中的课程，由各学院教学指导委员会认定，包括竞教结合课程、创新实践课程、创业教育课程等学分；

4.必修学时＋选修学时=总学时数；理论教学学时＋实验教学学时=总学时数；必修学分＋选修学分=总学分数；集中实践教学环节学分＋理论教学学分＋实验教学学分=总学分数

**二、课程设置表**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **类别** | **课 程**  **代 码** | **课程名称** | | **是否必修** | **学时数** | | | | **学分数** | **开课**  **学期** | **毕业**  **要求** |
| **总学时** | **实验** | **实习** | **其他** |
| **公 共 基 础 课** | 031101371 | 中国近现代史纲要 | | 必  修  课 | 40 |  |  | 4 | 2.5 | 1 | №8.1 |
| 031101661 | 思想道德与法治 | | 40 |  |  | 4 | 2.5 | 2 | №3.4  №6.1  №6.2  №8.1 |
| 031101522 | 马克思主义基本原理 | | 40 |  |  | 4 | 2.5 | 3 | №8.1  №12.1 |
| 031101423 | 毛泽东思想和中国特色社会主义理论体系概论 | | 72 |  |  | 24 | 4.5 | 4 | №7.1  №8.1  №12.1 |
| 031101331 | 形势与政策 | | 128 |  |  |  | 2.0 | 1-8 | №7.1  №8.1  №12.1 |
| 044101382 | 学术英语（一） | 英语A班修读 | 48 |  |  |  | 3.0 | 1 | №10.1  №10.3 |
| 044102453 | 学术英语（二） | 48 |  |  |  | 3.0 | 2 | №10.1  №10.3 |
| 044103681 | 大学英语（一） | 英语B、C班修读 | 48 |  |  |  | 3.0 | 1 | №10.1  №10.3 |
| 044103691 | 大学英语（二） | 48 |  |  |  | 3.0 | 2 | №10.1  №10.3 |
| 045101644 | 大学计算机基础 | | 32 |  |  | 32 | 1.0 | 1 | №5.1  №12.2 |
| 052100332 | 体育（一） | | 36 |  |  | 36 | 1.0 | 1 | №9.1  №9.2  №12.1 |
| 052100012 | 体育（二） | | 36 |  |  | 36 | 1.0 | 2 | №9.1  №9.2  №12.1 |
| 052100842 | 体育（三） | | 36 |  |  | 36 | 1.0 | 3 | №9.1  №9.2  №12.1 |
| 052100062 | 体育（四） | | 36 |  |  | 36 | 1.0 | 4 | №9.1  №9.2  №12.1 |
| 006100112 | 军事理论 | | 36 |  |  | 18 | 2.0 | 2 | №9.1 |
| 045100772 | C++程序设计基础 | | 40 |  |  | 8 | 2.0 | 1 | №2.3  №5.1  №5.3 |
| 074102992 | 工程制图 | | 48 |  |  |  | 3.0 | 1 | №2.3  №5.2  №5.3 |
| 040100051 | 微积分Ⅱ（一） | | 80 |  |  |  | 5.0 | 1 | №1.1  №2.2 |
| 040100411 | 微积分Ⅱ（二） | | 80 |  |  |  | 5.0 | 2 | №1.1  №2.2 |
| 040100401 | 线性代数与解析几何 | | 48 |  |  |  | 3.0 | 1 | №1.2  №11.1  №11.2 |
| 040100023 | 概率论与数理统计 | | 48 |  |  |  | 3.0 | 2 | №1.1  №1.2  №1.3  №11.3 |
| 041100952 | 基础物理（一） | | 48 |  |  |  | 3.0 | 1 | №1.1  №2.2  №10.3  №12.2 |
| 041100382 | 基础物理（二） | | 64 |  |  |  | 4.0 | 2 | №1.1  №2.2  №10.3  №12.2 |
| 041100161 | 基础物理实验（一） | | 32 | 32 |  |  | 1.0 | 2 | №2.3  №4.3  №4.4  №5.1  №5.2 |
| 041101481 | 基础物理实验（二） | | 32 | 32 |  |  | 1.0 | 4 | №2.3  №4.3  №4.4  №5.1  №5.2 |
| 041101891 | 数学物理方法 | | 64 |  |  |  | 4.0 | 3 | №1.1  №1.2  №1.4  №2.2 |
| 071104951 | 写作与沟通（人文科学领域） | | 通  识  课 | 32 |  |  |  | 2.0 | 4 | №10.1  №10.2  №10.3 |
| 030101291 | 工程认知（科学技术领域） | | 32 |  |  |  | 2.0 | 4 | №6.1  №6.2  №7.1  №8.3  №11.1  №11.2 |
|  | 人文科学、社会科学领域 | | 96 |  |  |  | 6.0 |  | № 8.1 |
| **合计** | | | | 1372 | 64 |  | 238 | 71 |  |  |

备注：学时中其他可以为上机和实践学时。

**二、课程设置表（续）**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **类别** | **课 程**  **代 码** | **课程名称** | **是否必修** | **学时数** | | | | **学分数** | **开课**  **学期** | **毕业**  **要求** |
| **总学时** | **实验** | **实习** | **其他** |
| **专业基础课** | 024100291 | 电路II | 必 | 64 |  |  |  | 4.0 | 2 | №1.2  №4.1 |
| 024100281 | 电路实验 | 必 | 16 | 16 |  |  | 0.5 | 3 | №2.3  №3.2  №4.3  №4.4  №5.1  №5.2 |
| 035100172 | 模拟电子技术II | 必 | 64 |  |  |  | 4.0 | 3 | №3.1  №4.1 |
| 070100042 | 模拟电子技术实验 | 必 | 16 | 16 |  |  | 0.5 | 4 | №2.3  №3.1  №4.3  №4.4  №5.1  №5.2 |
| 035100341 | 数字电子技术II | 必 | 64 |  |  |  | 4.0 | 4 | №3.1  №4.1 |
| 035101342 | 数字电子技术实验 | 必 | 16 | 16 |  |  | 0.5 | 4 | №2.3  №3.1  №4.3  №4.4  №5.1  №5.2 |
| 041101001 | 物理学的进化 | 必 | 16 |  |  |  | 1.0 | 1 | №2.1  №5.3  №7.1  №10.2  №12.2 |
| 041101731 | 光学前沿 | 必 | 16 |  |  |  | 1.0 | 2 | №3.3  №3.4  №5.3  №7.1  №10.2  №12.1 |
| 041101271 | 光学 | 必 | 64 |  |  |  | 4.0 | 3 | №1.1  №1.2  №2.3  №3.1  №4.1  №10.1 |
| 041102231 | 电动力学I | 必 | 64 |  |  |  | 4.0 | 4 | №1.1  №1.2  №2.1 |
| 041100392 | 信息论基础 | 必 | 48 |  |  |  | 3.0 | 5 | №1.3  №2.2  №4.4 |
| 041101702 | 工程光学 | 必 | 32 |  |  |  | 2.0 | 5 | №1.2  №1.3  №1.4  №3.2  №4.1 |
| 041100471 | 量子力学 | 必 | 64 |  |  |  | 4.0 | 5 | №1.1  №1.2  №2.1  №2.4 |
| 041102191 | 激光物理与技术 | 必 | 64 |  |  |  | 4.0 | 5 | №1.2  №1.3  №2.1  №2.4  №4.2  №9.1 |
| 041102051 | 光电子学基础 | 必 | 48 |  |  |  | 3.0 | 5 | №1.1  №2.4  №3.1  №4.1  №10.2 |
| 041100331 | 固体物理 | 必 | 64 |  |  |  | 4.0 | 6 | №1.2  №2.4  №4.1  №7.2  №9.2 |
| 041102201 | 光电专业实验I | 必 | 64 | 64 |  |  | 2.0 | 6 | №3.1  №4.3  №4.4  №5.1  №5.2 |
| 041102261 | 光电专业实验II | 必 | 80 | 80 |  |  | 2.5 | 7 | №3.1  №4.3  №4.4  №5.1  №5.2 |
| **合　计** | | 必 | 864 | 192 |  |  | 48 |  |  |
| **选修课** | **模块一光电技术** | | | | | | | | | |
| 041101423 | 信号与系统 | 选 | 48 |  |  |  | 3.0 | 4 | №1.1  №2.3 |
| 041101283 | 通信电路 | 选 | 32 |  |  |  | 2.0 | 4 | №1.1  №2.3  №5.1 |
| 041101531 | 光电技术 | 选 | 48 |  |  |  | 3.0 | 6 | №3.1  №4.3 |
| 041100862 | 嵌入式系统及应用 | 选 | 64 | 32 |  |  | 3.0 | 6 | №1.1  №3.1 |
| 041102071 | 虚拟现实与增强现实技术导论 | 选 | 32 |  |  |  | 2.0 | 6 | №2.3  №3.1 |
|  | **本模块选修13学分(选修本模块需选修本模块所有学分)** | | | | | | | | |
| **模块二光电感知与通信** | | | | | | | | | |
| 041101423 | 信号与系统 | 选 | 48 |  |  |  | 3.0 | 4 | №1.1  №2.3 |
| 041100483 | 数字信号处理 | 选 | 48 |  |  |  | 3.0 | 5 | №2.3  №3.1 |
| 041101292 | 传感技术 | 选 | 32 |  |  |  | 2.0 | 5 | №3.1  №4.3 |
| 041101911 | 光纤通信 | 选 | 48 |  |  |  | 3.0 | 6 | №3.1  №4.3 |
| 041102061 | 物联网基础 | 选 | 32 |  |  |  | 2.0 | 6 | №3.1  №4.3 |
|  | **本模块选修13学分(选修本模块需选修本模块所有学分)** | | | | | | | | |
| **模块三凝聚态物理** | | | | | | | | | |
| 041100532 | 半导体物理与器件 | 选 | 48 |  |  |  | 3.0 | 6 | №2.3  №3.1 |
| 041101262 | 材料物理 | 选 | 32 |  |  |  | 2.0 | 6 | №3.1  №5.1 |
| 041102251 | 固体理论II | 选 | 32 |  |  |  | 2.0 | 7 | №1.1  №2.3 |
| 041102091 | 物理学进展 | 选 | 48 |  |  |  | 3.0 | 6 | №2.3  №3.1 |
| 041102081 | 凝聚态物理实验方法 | 选 | 32 |  |  |  | 2.0 | 7 | №4.3  №5.1 |
|  | **本模块选修12学分(选修本模块需选修本模块所有学分)** | | | | | | | | |
| **光电信息公共选修课** | | | | | | | | | |
| 046100931 | 大数据分析与应用 | 选 | 32 |  |  |  | 2.0 |  | №1.1  №2.3 |
| 046101411 | 人工智能 | 选 | 32 |  |  |  | 2.0 |  | №1.1  №2.3 |
| 041100412 | 数据结构 | 选 | 48 |  |  |  | 3.0 | 3 | №2.1  №3.1 |
| 041100232 | 通信原理 | 选 | 48 |  |  |  | 3.0 | 5 | №1.1  №2.3 |
| 041101641 | 电子测量 | 选 | 48 |  |  |  | 3.0 | 5 | №3.1  №4.3  №4.4 |
| 041101992 | 新产业前沿及其物理基础 | 选 | 32 |  |  |  | 2.0 | 5 | №2.3  №2.4  №5.1  №7.2  №10.1  №12.1 |
| 041102221 | 数字图像处理 | 选 | 48 |  |  |  | 3.0 | 6 | №2.3  №3.1 |
| 041100971 | 薄膜光学 | 选 | 48 |  |  |  | 3.0 | 6 | №3.1  №4.1 |
| 041100221 | 光谱学基础 | 选 | 32 |  |  |  | 2.0 | 6 | №2.3  №3.1 |
| 041101121 | 非线性光学基础 | 选 | 32 |  |  |  | 2.0 | 6 | №1.1  №2.3 |
| 041101341 | 波分复用通信技术 | 选 | 32 |  |  |  | 2.0 | 6 | №3.1  №4.3 |
| 041100272 | 计算机通讯网 | 选 | 48 |  |  | 16 | 2.5 | 6 | №4.3  №5.1 |
| 041101921 | 光电信息与创业 | 选 | 16 |  |  |  | 1.0 | 7 | №5.1  №6.1  №8.2  №10.3 |
| 020100051 | 创新研究训练 | 选 | 32 |  |  |  | 2.0 | 7 | №6.2  №8.2  №11.3 |
| 020100041 | 创新研究实践I | 选 | 32 |  |  |  | 2.0 | 7 | №6.2  №8.2  №11.3 |
| 020100031 | 创新研究实践II | 选 | 32 |  |  |  | 2.0 | 7 | №6.2  №8.2  №11.3 |
| 020100061 | 创业实践 | 选 | 32 |  |  |  | 2.0 | 7 | №6.2  №8.2  №11.3 |
| **合　计** | | 选 | **选修课修读最低要求20学分** | | | | | | |

备注：

1. 学时中其他可以为上机和实践学时。

**2. 总选修学分要求最低为20学分。有三个选修模块：光电技术模块、光电感知与通信模块和凝聚态物理模块。学生选定某个模块后，必须选修这个模块内的所有课程，其余的学分再在公共选修课或其它模块中选修。**

3. 学生根据自己开展科研训练项目、学科竞赛、发表论文、获得专利和自主创业等情况申请折算为一定的专业选修课学分（创新研究训练、创新研究实践I、创新研究实践II、创业实践等创新创业课程）。每个学生累计申请为专业选修课总学分不超过4个学分。经学校批准认定为选修课学分的项目、竞赛等不再获得对应第二课堂的创新学分。

**三、集中实践教学环节**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **课 程**  **代 码** | **课程名称** | **是否必修** | **学时数** | | **学分数** | **开课**  **学期** | **毕业要求** |
| **实践** | **授课** |
| 006100151 | 军事技能 | 必 | 2周 |  | 2.0 | 1 | №9.1  №9.2 |
| 031101551 | 马克思主义理论与实践 | 必 | 2周 |  | 2.0 | 3 | №8.1  №8.2 |
| 030100702 | 工程训练Ⅰ | 必 | 2周 |  | 2.0 | 4 | №3.3  №6.1  №7.2  №8.3  №11.1  №11.2 |
| 041100131 | 电子工艺实习II | 必 | 2周 |  | 2.0 | 5 | №2.1  №3.1  №3.4  №6.1 |
| 041102181 | 工程光学课程设计 | 必 | 3周 |  | 3.0 | 5 | №1.4  №3.2  №4.2  №7.2  №10.1  №11.3 |
| 041101881 | 固体物理课程设计 | 必  (模块三) | 2周 |  | 2.0 | 6 | №3.1  №4.1 |
| 041102171 | 光电技术课程设计 | 必  (模块一) | 2周 |  | 2.0 | 7 | №3.1  №4.1  №5.1 |
| 041102161 | 光电感知与通信课程设计 | 必  (模块二) | 2周 |  | 2.0 | 7 | №3.1  №4.1  №5.1 |
| 041102041 | 光电项目实践 | 必 | 4周 |  | 4.0 | 7 | №3.3  №6.2  №8.2  №9.1  №9.2  №11.2 |
| 041100561 | 毕业实习 | 必 | 4周 |  | 4.0 | 8 | №6.2  №8.2  №8.3  №9.1  №9.2  №11.1 |
| 041100553 | 毕业设计 | 必 | 14周 |  | 10.0 | 8 | №2.4  №4.2  №7.1  №10.2  №10.3  №11.3 |
| **合　计** | | 必 | 35周 |  | 31.0 |  |  |

备注：

光电技术课程设计：模块一光电技术必修。

光电感知与通信课程设计：模块二光电感知与通信必修。

固体物理课程设计：模块三凝聚态物理必修。

**四、第二课堂**

第二课堂由人文素质教育和创新能力培养两部分组成。

**1.人文素质教育基本要求**

学生在取得专业教学计划规定学分的同时，还应结合自己的兴趣适当参加课外人文素质教育活动，参加活动的学分累计不少于3个学分。其中，大学体育教学团队开设课外体育课程，高年级本科生必修，72学时，1学分，纳入第二课堂人文素质教育学分。

**2.创新能力培养基本要求**

学生在取得本专业教学计划规定学分的同时，还必须参加国家创新创业训练计划、广东省创新创业训练计划、SRP（学生研究计划）、百步梯攀登计划或一定时间的各类课外创新能力培养活动（如学科竞赛、学术讲座等），参加活动的学分累计不少于4个学分。

**Opto-electronics Information Science and Engineering**

**(Optoelectronic Information)**

**Program Code: 080705 Duration：4 years**

**Educational Objectives:**

Based on the education policy of the Communist Party of China, aimed at cultivating talents with high morals, based on the strategic needs of national emergent industries and optoelectronic information industrial cluster of Guangdong- Hongkong-Macao-Greater-Bay, the program aims at preparing socialist, all-rounded, high-quality talents with solid foundation in mathematical, basic optoelectronic information theory and practice skills, with strong scientific perception and research, development and management abilities. It will enable students to be capable of comprehensive English skill and practical skill, excellent human quality and innovation spirit. Students can be able to adapt to technological progress and changes in social demands in fields of optoelectronic technology, and optoelectronic perception and communication and have high-quality "three innovation" (innovation, creation, and entrepreneurship) talents with learning, thinking and action capabilities.

The educational objectives for graduates of this major include the following three points:

1 Be able to promote the development of cutting-edge technologies in optoelectronic information science and engineering, have outstanding engineering innovation awareness, and be able to flexibly use modern tools and related technologies to engage in research, development and management in the fields of optoelectronic technology, optoelectronic perception and communication.

2 Students can possess excellent professionalism and outstanding innovation ability, can continuously adapt to the modern technology development of optoelectronic information science and engineering under the new international and domestic situation, proficiently master and apply relevant scientific theories and professional knowledge, and be able to act as a team or project leader , technology or management backbones carry out innovative and systematic R&D work on complex engineering issues in the fields of optoelectronic technology, optoelectronic perception and communication.

3 Students can possess excellent ethics, scientific literacy, humanistic qualities, innovative awareness, legal concepts, cooperative spirit, international vision and social responsibility, and the ability to learn and adapt to development for life.

**Student Outcomes:**

№1. Engineering Knowledge: An ability to apply knowledge of mathematics, science, engineering fundamentals and engineering specialization to the solution of complex optoelectronic information science and engineering problems.

№1.1 Possess the mathematics, natural sciences, engineering foundation and professional knowledge required to solve complex problems in optoelectronic information science and engineering.

№1.2 Be able to use the language tools of mathematics, natural sciences, and engineering sciences for the expression of complex problems in optoelectronic information science and engineering, and can establish and implement mathematical models for specific objects in complex problems in optoelectronic information science and engineering.

№1.3 Be able to use relevant knowledge and mathematical models to derive and analyze complex problems in optoelectronic information science and engineering.

№1.4 ​​Be able to apply relevant knowledge and mathematical model methods to the comparison and synthesis of solutions to complex problems in optoelectronic information science and engineering.

№2. Problem Analysis: An ability to identify, formulate and analyze complex optoelectronic information science and engineering problems, reaching to substantiated conclusions using basic principles of mathematics, science, and engineering.

№2.1 Be able to analyze, identify and judge the key factors affecting the performance and quality of optoelectronic information products based on the basic principles of mathematics, natural sciences and engineering sciences.

№2.2 Be able to correctly express complex engineering problems in optoelectronic information science and engineering applications based on relevant scientific principles and mathematical model methods.

№2.3 Be able to combine basic principles and literature research to analyze and demonstrate, propose possible solutions, and recognize the diversity of solutions for the complex problems in the application of optoelectronic information science and engineering.

№2.4 Be able to use basic professional principles and literature research to analyze the influencing factors in the application of optoelectronic information science and engineering, and obtain effective conclusions.

№3. Design / Development Solutions: An ability to design solutions for complex optoelectronic information science and engineering problems and innovatively design systems, components or process that meet specific needs with societal, public health, safety, legal, cultural and environmental considerations.

№3.1 Be able to master the basic design and development methods and technologies of the entire cycle and process of engineering design and product development, and understand various factors that affect design goals and technical solutions for complex engineering problems in the design of optoelectronic information products.

№3.2 Be able to complete the unit design according to the specific working conditions and specific performance requirements of the optoelectronic information product manufacturing.

№3.3 Be Able to design optoelectronic information product system or process flow, and reflect the sense of innovation in the design.

№3.4 In the design of optoelectronic information products, safety, health, law, culture, and environmental constraints can be considered, and possible negative effects can be actively avoided.

№4. Research: An ability to conduct investigations of complex optoelectronic information science and engineering problems based on scientific theories and adopting scientific methods including design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions.

№4.1 Be able to investigate and analyze solutions to complex engineering problems based on natural science and professional basic principles, through literature research and related methods for complex engineering problems in the design, development, manufacturing and application of optoelectronic information products.

№4.2 Be able to choose the research route and design the use plan according to the requirements for the complex engineering problems in the design, development, manufacturing and application of optoelectronic information products.

№4.3 The experimental system can be constructed according to the experimental plan, the experiment can be carried out safely, and the experimental data can be collected correctly for complex engineering problems in the design, development, manufacturing and application of optoelectronic information products.

№4.4 Be able to analyze and interpret experimental results, and obtain reasonable and effective conclusions through information synthesis.

№5. Applying Modern Tools: An ability to create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex optoelectronic information science and engineering activities, with an understanding of the limitations.

№5.1 Be able to understand the usage principles and methods of modern instruments, information technology tools, engineering tools and simulation software commonly used in optoelectronic information science and engineering, and understand their limitations.

№5.2 Be able to select and use appropriate instruments, information resources, engineering tools and professional simulation software to analyze, calculate and design complex issues in optoelectronic information science and engineering.

№5.3 Be able to develop or select modern tools that meet specific needs for specific objects of optoelectronic information science and engineering, simulate and predict professional problems, and analyze its limitations.

№6. Engineering and Society: An ability to apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional optoelectronic information engineering practice.

№6.1 Students can fully understand the important position and role of optoelectronic information science in technological progress and social development, understand the technical standard system, intellectual property rights, industrial policies, laws and regulations in related fields of optoelectronic information professional, and understand the impact of different social cultures on engineering activities.

№6.2 Through experiments, practice and internships in the design, development, manufacturing and application of optoelectronic information products, students can analyze and evaluate the impact of engineering practice on society, health, safety, law and culture, and the impact of these factors on project implementation, and can understand and clarify the responsibilities and obligations that should be undertaken.

№7. Environment and Sustainable Development: An ability to understand and evaluate the impact of professional optoelectronic information engineering solutions in environmental and societal contexts and demonstrate knowledge of and need for sustainable development.

№7.1 Students can know and understand the concept and connotation of environmental protection and sustainable development.

№7.2 Students can fully understand the damage and hidden dangers that may be caused to humans and the environment in the process of photoelectric information production practice, can fully consider and evaluate environmental influence factors when formulating complex engineering problem solutions, and stand in the perspective of environmental protection and sustainable development self-discipline.

№8. Professional Standards: An understanding of humanity science and social responsibility, being able to understand and abide by professional ethics and standards responsibly in optoelectronic information engineering practice.

№8.1 Students can have humanities and social sciences, a firm belief in socialism and a sense of social responsibility, have correct values, understand the relationship between individuals and society, and understand China's national conditions.

№8.2 Students can understand the engineering professional ethics and norms of honesty, fairness and integrity, and can consciously abide by them in engineering practice.

№8.3 Students can understand the social responsibility of engineers for the safety, health and well-being of the public and environmental protection, and be able to judge and evaluate the social responsibility of practical activities in the field of optoelectronic information science and engineering, and consciously perform their responsibilities.

№9. Individual and Teams: An ability to function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.

№9.1 Students have a sense of teamwork and can effectively communicate with other members and work together in an interdisciplinary background.

№9.2 Be able to treat the roles of individuals, team members and leaders correctly, able to work independently or cooperatively in the team, and able to organize, coordinate and direct the work of the team.

№10. Communication: An ability to communicate effectively on complex optoelectronic information engineering problems with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, give and receive clear instructions, and communicate in cross-cultural contexts with international perspective.

№10.1 Students can accurately express one's own views, respond to queries, and understand the differences in communication with industry peers and the public on issues related to optoelectronic information science and engineering in oral, manuscripts, charts, etc.

№10.2 Students can understand the international development trends and research hotspots in the field of optoelectronic information science and engineering, understand and respect the differences and diversity of different cultures in the world.

№10.3 Students can possess the language and written expression ability of cross-cultural communication, can conduct basic communication and exchange in the cross-cultural background on the professional issues of optoelectronic information science and engineering.

№11. Project Management: Demonstrate knowledge and understanding of optoelectronic information engineering management principles and methods of economic decision-making, to function in multidisciplinary environments.

№11.1 Students can master the management and economic decision-making methods involved in optoelectronic information engineering projects.

№11.2 Students can understand the cost structure of optoelectronic information engineering and the whole product cycle and process, and understand the engineering management and economic decision-making issues involved.

№11.3 According to the market, user needs and technological development changes, in a multi-disciplinary environment, in the process of designing and developing solutions, students can use engineering management and economic decision-making methods to conduct feasibility analysis.

№12. Lifelong Learning: A recognition of the need for, and an ability to engage in independent and life-long learning with the ability to learn continuously and adapt to new developments.

№12.1 Students can have good physical and psychological qualities, correct world outlook, values ​​and outlook on life, agree with the concept of lifelong education and continuous education, and be able to recognize the necessity of independent learning and lifelong learning in the context of social development.

№12.2 Students have the ability to learn independently, to learn foreign languages ​​consciously, to track and obtain information using modern information technologies such as computers and search engines, and to adapt to the development of new technologies in the field of optoelectronic information science and engineering, including the ability to understand and summarize new technologies.

**Program Profile：**

The undergraduate program of Opto-electronics Information Science and Engineering (Optoelectronic Information) is based on the discipline of Physics and was founded in 2002 as “Optical Information Science and Technology”. It was renamed as Opto-electronics Information Science and Engineering (Optoelectronic Information) in 2013.

Teachers of this major have good ethics and style, and their professional background and scientific research directions cover two directions including optics and physical electronics. There are 23 staffs for the program which includes 10 professors, 9 associate professors, and 4 lecturers with strong background in optics, optoelectronics, etc. There are one center for LED Engineering Research (Provincial engineering research center), one undergraduate laboratory with more than 600 square meters and one research experimental platform for photonic crystal and micro-nano optical structure. The program focuses on cultivating students with solid foundation in optoelectronic information science who have international perspective and the innovation ability in fields of optoelectronic technology, optoelectronic perception and communication.

**Program Features:**

The talents training aims at the combination of science and engineering, highlights the characteristics of strong international education and competition, and focuses on forming students' research, practical capabilities and innovation ability. It cultivates students with widely employment and deepening foundation in the field of optoelectronic information.

**Degree Conferred:** Bachelor of Engineering

**Core Courses:**

Optics, Electrodynamics, Fundamentals of Information Theory, Engineering Optics, Quantum Mechanics, Fundamentals of Optoelectronics, Laser Physics and Technology, Solid State Physics.

**Featured Courses:**

**Freshmen Seminars:** Evolution of Physics，Advances in Optics

**Bilingual Courses:** Solid State Physics, Signals and Systems, Optoelectronic Technology, Introduction to VR and AR, Digital Signal Processing, Communication Principles, Optical Fiber Communications, Digital Image Processing, Wavelength Division Multiplexing Technology, Computer Communication Networks

**Courses Taught in English:** Fundamental of Physics (1), Fundamental of Physics (2), Optics

**Subject Frontiers Courses:** Frontier of New Industry and Its Physical Foundation

**Cooperative Courses with Enterprises:** Practice on Diploma Project

**Innovation Practice:** Project Practice of Optoelectronics

**Entrepreneurship Courses:** Optoelectronics Information and Entrepreneurial Practice

**Special Designs:** Course Design of Engineering Optics, Course Design of Optoelectronic Technology, Course Design of Optoelectronics Perception and Communication, Course Design of Solid State Physics

**Education on the Hard-Working Spirit:** Practice on Diploma Project

**1. Registration Form of Curriculum Credits**

**1.1 Credits Registration Form**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Course Category | Requirement | Credits | Academic Hours | Remarks |
| General Basic Courses | Compulsory | 61 | 1212 |  |
| General Education | 10 | 160 |  |
| Specialty Basic Courses | Compulsory | 48 | 864 |  |
| Elective Courses | Elective | 20 | 320 |  |
| Total | | 139 | 2556 |  |
| Practice Training (Weeks) |  | 31 | 35周 |  |
| Credits Required for Graduation | 170 | | | |

**1.2 Category Registration Form**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Academic Hours | | | | | Credits | | | | | | |
| Total | Include | | Include | | Total | Include | | Include | | | Include |
| Compulsory | Elective | Theory Course | Lab | Compulsory | Elective | Practice-concentrated Training | Theory Course Credits | Lab | Innovation and Entrepreneurship Education |
| 2556 | 2076 | 480 | 2062 | 494 | 170 | 140 | 30 | 31 | 120 | 19 | 4 |

**2. Courses Schedule**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Course Category | Course No. | Course Title | | C/E | Total Curriculum Hours | | | | Credits | Semester | Student Outcomes |
| Class Hours | Lab Hours | Practice Hours | Other Hours |
| **General Basic Courses** | 031101371 | Skeleton of Chinese Modern History | | C | 40 |  |  | 4 | 2.5 | 1 | №8.1 |
| 031101661 | Ethics and Rule of Law | | 40 |  |  | 4 | 2.5 | 2 | №3.4  №6.1  №6.2  №8.1 |
| 031101522 | Fundamentals of Marxism Principle | | 40 |  |  | 4 | 2.5 | 3 | №8.1  №12.1 |
| 031101423 | Thought of Mao Ze Dong and Theory of Socialism with Chinese Characteristics | | 72 |  |  | 24 | 4.5 | 4 | №7.1  №8.1  №12.1 |
| 031101331 | Analysis of the Situation & Policy | | 128 |  |  |  | 2.0 | 1-8 | №7.1  №8.1  №12.1 |
| 044101382 | English for Academic Purposes (1) | for English Class A | 48 |  |  |  | 3.0 | 1 | №10.1  №10.3 |
| 044102453 | English for Academic Purposes (2) | 48 |  |  |  | 3.0 | 2 | №10.1  №10.3 |
| 044103681 | College English (1) | for English Class B、C | 48 |  |  |  | 3.0 | 1 | №10.1  №10.3 |
| 044103691 | College English (2) | 48 |  |  |  | 3.0 | 2 | №10.1  №10.3 |
| 045101644 | Foundations of Computer | | 32 |  |  | 32 | 1.0 | 1 | №5.1  №12.2 |
| 052100332 | Physical Education (1) | | 36 |  |  | 36 | 1.0 | 1 | №9.1  №9.2  №12.1 |
| 052100012 | Physical Education (2) | | 36 |  |  | 36 | 1.0 | 2 | №9.1  №9.2  №12.1 |
| 052100842 | Physical Education (3) | | 36 |  |  | 36 | 1.0 | 3 | №9.1  №9.2  №12.1 |
| 052100062 | Physical Education (4) | | 36 |  |  | 36 | 1.0 | 4 | №9.1  №9.2  №12.1 |
| 006100112 | Military Principle | | 36 |  |  | 18 | 2.0 | 2 | №9.1 |
| 045100772 | C++ Programming Foundations | | 40 |  |  | 8 | 2.0 | 1 | №2.3  №5.1  №5.3 |
| 074102992 | Engineering Drawing | | 48 |  |  |  | 3.0 | 1 | №2.3  №5.2  №5.3 |
| 040100051 | Calculus Ⅱ (1) | | 80 |  |  |  | 5.0 | 1 | №1.1  №2.2 |
| 040100411 | Calculus Ⅱ (2) | | 80 |  |  |  | 5.0 | 2 | №1.1  №2.2 |
| 040100401 | Linear Algebra &  Analytic Geometry | | 48 |  |  |  | 3.0 | 1 | №1.2  №11.1  №11.2 |
| 040100023 | Probability & Mathematical Statistics | | 48 |  |  |  | 3.0 | 2 | №1.1  №1.2  №1.3  №11.3 |
| 041100952 | Fundamental of Physics (1) | | 48 |  |  |  | 3.0 | 1 | №1.1  №2.2  №10.3  №12.2 |
| 041100382 | Fundamental of Physics (2) | | 64 |  |  |  | 4.0 | 2 | №1.1  №2.2  №10.3  №12.2 |
| 041100161 | Experiment of Fundamental Physics (1) | | 32 | 32 |  |  | 1.0 | 2 | №2.3  №4.3  №4.4  №5.1  №5.2 |
| 041101481 | Experiment of Fundamental Physics (2) | | 32 | 32 |  |  | 1.0 | 4 | №2.3  №4.3  №4.4  №5.1  №5.2 |
| 041101891 | Mathematic Methods for Physics | | 64 |  |  |  | 4.0 | 3 | №1.1  №1.2  №1.4  №2.2 |
| 071104951 | Writing and Communication (Humanities) | | E | 32 |  |  |  | 2.0 | 4 | №10.1  №10.2  №10.3 |
| 030101291 | Engineering Fundamentals (Science and technology) | | 32 |  |  |  | 2.0 | 4 | №6.1  №6.2  №7.1  №8.3  №11.1  №11.2 |
|  | Humanities and Social Science | | 96 |  |  |  | 6.0 |  | № 8.1 |
| **Total** | | | | 1372 | 64 |  | 238 | 71 |  |  |

**2. Courses Schedule**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Course Category | Course No. | Course Title | C/E | Total Curriculum Hours | | | | Credits | Semester | Student Outcomes |
| Class Hours | Lab Hours | Practice Hours | Other Hours |
| **Specialty Basic Courses** | 024100291 | Electric Circuits | C | 64 |  |  |  | 4.0 | 2 | №1.2  №4.1 |
| 024100281 | Experiment of Circuit | C | 16 | 16 |  |  | 0.5 | 3 | №2.3  №3.2  №4.3  №4.4  №5.1  №5.2 |
| 035100172 | Analog Electronics II | C | 64 |  |  |  | 4.0 | 3 | №3.1  №4.1 |
| 070100042 | Experiment of Analog Electronics | C | 16 | 16 |  |  | 0.5 | 4 | №2.3  №3.1  №4.3  №4.4  №5.1  №5.2 |
| 035100341 | Digital Electronics II | C | 64 |  |  |  | 4.0 | 4 | №3.1  №4.1 |
| 035101342 | Experiment of Digital Electronics | C | 16 | 16 |  |  | 0.5 | 4 | №2.3  №3.1  №4.3  №4.4  №5.1  №5.2 |
| 041101001 | Evolution of Physics | C | 16 |  |  |  | 1.0 | 1 | №2.1  №5.3  №7.1  №10.2  №12.2 |
| 041101731 | Frontiers in Optics | C | 16 |  |  |  | 1.0 | 2 | №3.3  №3.4  №5.3  №7.1  №10.2  №12.1 |
| 041101271 | Optics | C | 64 |  |  |  | 4.0 | 3 | №1.1  №1.2  №2.3  №3.1  №4.1  №10.1 |
| 041102231 | Electrodynamics I | C | 64 |  |  |  | 4.0 | 4 | №1.1  №1.2  №2.1 |
| 041100392 | Fundamentals of Information Theory | C | 48 |  |  |  | 3.0 | 5 | №1.3  №2.2  №4.4 |
| 041101702 | Engineering Optics | C | 32 |  |  |  | 2.0 | 5 | №1.2  №1.3  №1.4  №3.2  №4.1 |
| 041100471 | Quantum Mechanics | C | 64 |  |  |  | 4.0 | 5 | №1.1  №1.2  №2.1  №2.4 |
| 041102191 | Laser Physics and Technology | C | 64 |  |  |  | 4.0 | 5 | №1.2  №1.3  №2.1  №2.4  №4.2  №9.1 |
| 041102051 | Fundamentals of Optoelectronics | C | 48 |  |  |  | 3.0 | 5 | №1.1  №2.4  №3.1  №4.1  №10.2 |
| 041100331 | Solid State Physics | C | 64 |  |  |  | 4.0 | 6 | №1.2  №2.4  №4.1  №7.2  №9.2 |
| 041102201 | Optoelectronics  Specialized Experiments I | C | 64 | 64 |  |  | 2.0 | 6 | №3.1  №4.3  №4.4  №5.1  №5.2 |
| 041102261 | Optoelectronics  Specialized Experiments II | C | 80 | 80 |  |  | 2.5 | 7 | №3.1  №4.3  №4.4  №5.1  №5.2 |
| **Total** | | C | 864 | 192 |  |  | 48 |  |  |
| **Elective Courses** | **Module No. 1: Optoelectronic Technology** | | | | | | | | | |
| 041101423 | Signals and Systems | E | 48 |  |  |  | 3.0 | 4 | №1.1  №2.3 |
| 041101283 | Communication Circuit | E | 32 |  |  |  | 2.0 | 4 | №1.1  №2.3  №5.1 |
| 041101531 | Optoelectronic Technology | E | 48 |  |  |  | 3.0 | 6 | №3.1  №4.3 |
| 041100862 | Embedded System and Application | E | 64 | 32 |  |  | 3.0 | 6 | №1.1  №3.1 |
| 041102071 | Introduction to VR and AR | E | 32 |  |  |  | 2.0 | 6 | №2.3  №3.1 |
|  | **Elective course credits: 13 (Select all credits of this module if it is selected)** | | | | | | | | |
| **Module No. 2: Optoelectronic Perception and Communication** | | | | | | | | | |
| 041101423 | Signals and Systems | E | 48 |  |  |  | 3.0 | 4 | №1.1  №2.3 |
| 041100483 | Digital Signal Processing | E | 48 |  |  |  | 3.0 | 5 | №2.3  №3.1 |
| 041101292 | Sensor Technology | E | 32 |  |  |  | 2.0 | 5 | №3.1  №4.3 |
| 041101911 | Optical Fiber Communications | E | 48 |  |  |  | 3.0 | 6 | №3.1  №4.3 |
| 041102061 | Fundamentals of Internet of Things | E | 32 |  |  |  | 2.0 | 6 | №3.1  №4.3 |
|  | **Elective course credits: 13 (Select all credits of this module if it is selected)** | | | | | | | | |
| **Module No.3: Condensed Matter Physics** | | | | | | | | | |
| 041100532 | Semiconductor Physics and Devices | E | 48 |  |  |  | 3.0 | 6 | №2.3  №3.1 |
| 041101262 | Materials Physics | E | 32 |  |  |  | 2.0 | 6 | №3.1  №5.1 |
| 041102251 | Solid State Theory II | E | 32 |  |  |  | 2.0 | 7 | №1.1  №2.3 |
| 041102091 | Advances in physics | E | 48 |  |  |  | 3.0 | 6 | №2.3  №3.1 |
| 041102081 | Experiment Methods in Condensed Matter Physics | E | 32 |  |  |  | 2.0 | 7 | №4.3  №5.1 |
|  | **Elective course credits: 12 (Select all credits of this module if it is selected)** | | | | | | | | |
| **General Elective Course of Optoelectronics Information** | | | | | | | | | |
| 046100931 | Analysis and Application of Big Data | E | 32 |  |  |  | 2.0 |  | №1.1  №2.3 |
| 046101411 | Artificial Intelligence | E | 32 |  |  |  | 2.0 |  | №1.1  №2.3 |
| 041100412 | Data Structure | E | 48 |  |  |  | 3.0 | 3 | №2.1  №3.1 |
| 041100232 | Communication Principles | E | 48 |  |  |  | 3.0 | 5 | №1.1  №2.3 |
| 041101641 | Electronic Measurement | E | 48 |  |  |  | 3.0 | 5 | №3.1  №4.3  №4.4 |
| 041101992 | Frontier of new Industry and Its Physical Foundation | E | 32 |  |  |  | 2.0 | 5 | №2.3  №2.4  №5.1  №7.2  №10.1  №12.1 |
| 041102221 | Digital Image Processing | E | 48 |  |  |  | 3.0 | 6 | №2.3  №3.1 |
| 041100971 | Thin Film Optics | E | 48 |  |  |  | 3.0 | 6 | №3.1  №4.1 |
| 041100221 | Fundamental Spectroscopy | E | 32 |  |  |  | 2.0 | 6 | №2.3  №3.1 |
| 041101121 | Fundamentals of Nonlinear Optics | E | 32 |  |  |  | 2.0 | 6 | №1.1  №2.3 |
| 041101341 | Wavelength Division Multiplexing  Technology | E | 32 |  |  |  | 2.0 | 6 | №3.1  №4.3 |
| 041100272 | Computer Communication  Networks | E | 48 |  |  | 16 | 2.5 | 6 | №4.3  №5.1 |
| 041101921 | Optoelectronics Information  and Entrepreneurial Practice | E | 16 |  |  |  | 1.0 | 7 | №5.1  №6.1  №8.2  №10.3 |
| 020100051 | Innovation Research Training | E | 32 |  |  |  | 2.0 | 7 | №6.2  №8.2  №11.3 |
| 020100041 | Innovation Research Practice I | E | 32 |  |  |  | 2.0 | 7 | №6.2  №8.2  №11.3 |
| 020100031 | Innovation Research Practice II | E | 32 |  |  |  | 2.0 | 7 | №6.2  №8.2  №11.3 |
| 020100061 | Entrepreneurial Practice | E | 32 |  |  |  | 2.0 | 7 | №6.2  №8.2  №11.3 |
| **Total** | | **E** | **Minimum elective course credits required: 20** | | | | | | |

**3. Practice-concentrated Training**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Course No | Course Title | C/E | Total Curriculum Hours | | Credits | Semester | Student Outcomes |
| Practice  weeks | Lecture Hours |
| 006100151 | Military Training | C | 2 weeks |  | 2.0 | 1 | №9.1  №9.2 |
| 031101551 | Marxism Theory and Practice | C | 2 weeks |  | 2.0 | 3 | №8.1  №8.2 |
| 030100702 | Engineering Training I | C | 2 weeks |  | 2.0 | 4 | №3.3  №6.1  №7.2  №8.3  №11.1  №11.2 |
| 041100131 | Exercitation of Electronic TechnologyⅡ | C | 2 weeks |  | 2.0 | 5 | №2.1  №3.1  №3.4  №6.1 |
| 041102181 | Course Design of Engineering Optics | C | 3 weeks |  | 3.0 | 5 | №1.4  №3.2  №4.2  №7.2  №10.1  №11.3 |
| 041101881 | Course Design of Solid State Physics | C  (Module No.3) | 2 weeks |  | 2.0 | 6 | №3.1  №4.1 |
| 041102171 | Course Design of Optoelectronic Technology | C  (Module No.1) | 2 weeks |  | 2.0 | 7 | №3.1  №4.1  №5.1 |
| 041102161 | Course Design of Optoelectronic Perception and Communication | C  (Module No.2) | 2 weeks |  | 2.0 | 7 | №3.1  №4.1  №5.1 |
| 041102041 | Project Practice of Optoelectronics | C | 4 weeks |  | 4.0 | 7 | №3.3  №6.2  №8.2  №9.1  №9.2  №11.2 |
| 041100561 | Practice on Diploma Project | C | 4 weeks |  | 4.0 | 8 | №6.2  №8.2  №8.3  №9.1  №9.2  №11.1 |
| 041100553 | Diploma Project | C | 14 weeks |  | 10.0 | 8 | №2.4  №4.2  №7.1  №10.2  №10.3  №11.3 |
| **Total** | | **C** | **35 weeks** |  | 31.0 |  |  |

**4. “Second Classroom” Activities**

“Second Classroom” Activities are comprised of two parts, Humanities Quality Education and Innovative Ability Cultivation.

1) Basic Requirements of Humanities Quality Education

Besides gaining course credits listed in one’s subject teaching curriculum, a student is required to participate in extracurricular activities of Humanities Quality Education based on one’s interest, acquiring no less than three credits. The advanced undergraduates must complete one of courses of Humanities Quality Education which has seventy two class hours (it's equivalent to one credit which belongs to Humanities Quality Education Credit of Extracurricular Class) offered by the College Physical Education Teaching Group.

2) Basic Requirements of Innovative Ability Cultivation

Besides gaining course credits listed in one’s subject teaching curriculum, a student is required to participate in any one of the following activities: National Undergraduate Training Programs for Innovation and Entrepreneurship, Guangdong Undergraduate Training Programs for Innovation and Entrepreneurship, Student Research Program (SRP), One-hundred-steps Innovative Program, or any other extracurricular activities of Innovative Ability Cultivation that last a certain period of time (e.g. subject contests, academic lectures), acquiring no less than four credits.