普通高等学校本科专业设置申请表

（备案专业适用）

学校名称（盖章）：西安交通工程学院

学校主管部门：陕西省

专业名称：机械电子工程

专业代码：080204

所属学科门类及专业类：工学 机械类

学位授予门类：工学

修业年限：四年

申请时间：2022-7-15

专业负责人：贾雄伟

联系电话：029-89028423

教育部制

目 录

1．普通高等学校增设本科专业基本情况表

2．学校基本情况表

3．增设专业的理由和基础

4．增设专业人才培养方案

5．专业主要带头人简介

6．教师基本情况表

7．主要课程开设情况一览表

8．其他办学条件情况表

9．学校近三年新增专业情况表

填 表 说 明

1. 本表适用于普通高等学校增设《普通高等学校本科专业目录》内专业（国家控制布点的专业除外）。
2. 申请表限用A4纸张打印填报并按专业分别装订成册。
3. 在学校办学基本类型、已有专业学科门类项目栏中，根据学校实际情况在对应的方框中画√。
4. 本表由申请学校的校长签字报出。
5. 申请学校须对本表内容的真实性负责。

1．普通高等学校增设本科专业基本情况表

|  |  |  |  |
| --- | --- | --- | --- |
| 专业代码 | 080204 | 专业名称 | 机械电子工程 |
| 修业年限 | 4年 | 学位授予门类 | 工学 |
| 学校开始举办本科教育的年份 | 2014年 | 现有本科专业（个） | 20个 |
| 学校本年度  其他拟增设的  专业名称 | 交通设备与控制工程 | 本校已设的相近本、专科专业及开设年份 | 电气工程及其自动化（本科）2014  机械设计制造及其自动化（本科）2015  车辆工程（本科）2016  机器人工程（本科）2021  电气自动化技术（专科）2007  机械制造及自动化（专科）2013 |
| 拟首次招生时间  及招生数 | 2023年  60人 | 五年内计划  发展规模 | 300人 |
| 师范专业标识  （师范S、兼有J） |  | 所在院系名称 | 机械与电气工程学院 |
| 高等学校专业设置评议专家组织审议意见 | （主任签字）  年 月 日 | 学校审批意见  （校长签字） | （盖章）  年 月 日 |
| 高等学校  主管部门形式  审核意见（根据  是否具备该专业办学条件、申请  材料是否真实等给出是否同意  备案的意见） | （盖章）  年 月 日 | | |

⒉学校基本情况表

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 学校名称 | 西安交通工程学院 | 学校地址 | | 西安市鄠邑区渼陂西路1号 | | |
| 邮政编码 | 713000 | 校园网址 | | http://www.xjgyedu.cn | | |
| 学校办学  基本类型 | □部委院校 □地方院校 □公办 √民办  □中外合作办学机构 | | | | | |
| □大学 √学院   □独立学院 | | | | | |
| 在校本科生总数 | 8806 | | 专业平均年招生规模 | | 155 | |
| 已有专业  学科门类 | □哲学 □经济学 □法学 √教育学 □文学 □历史学  □理学 √工学 □农学 □医学 √管理学 √艺术学 | | | | | |
| 专任教师  总数（人） | 579 | | 专任教师中副教授及以上职称教师数及所占比例 | | | 30.89% |
| 学校简介和  历史沿革  （150字以内，无需加页） | 西安交通工程学院创办于1994年，2014年经教育部批准为普通本科院校，2018年获批为学士学位授予权单位。学校以“自强不息，修德载物”为校训，坚持“笃实惟新、负重图强、驰而不息、交通报国”的大学精神。遵循“育人为本、理论为基、实践为要、能力为重”的培养思路和“五位一体”的育人模式，致力培养服务轨道交通行业和地方经济建设发展的高素质应用型人才。 | | | | | |

注：专业平均年招生规模=学校当年本科招生数÷学校现有本科专业总数

3．增设专业的理由和基础

|  |
| --- |
| (简述学校定位、人才需求、专业筹建等情况)（无需加页）  **一、学校定位**  西安交通工程学院是教育部批准的全日制普通本科高等院校。学校专业设置以工科为主，轨道交通类、电气信息类、人文与管理类专业群为重点，形成了工学、管理学、教育学、艺术学等多学科融合协调发展的学科体系。学校现有本科专业20个。  学校坚持“地方性、行业性、应用型”办学定位，根植西安、辐射周边，服务轨道交通行业和区域经济社会发展，以立德树人为根本，着力培养思想品德优、专业基础实、实践能力强、综合素质高、职业适应快的应用型人才。经过二十多年建设发展，已形成了以轨道交通学科专业为主的办学特色和以校企合作产教融合“中兴模式”为引领的多类型协同育人应用型人才培养模式特色，构建了“价值塑造、知识传授、能力培养、素质提升和实践锻炼”五位一体的应用型人才培养体系，着力建设特色鲜明、优势突出、区域一流、国内知名的高水平应用型大学。   1. **人才需求**   1、主要就业领域  机械电子工程专业将以西安交通工程学院轨道交通办学特色和定位出发，瞄准我国高速铁路发展和城市轨道交通发展需求，培养高速轨道交通移动设备和城市轨道交通车辆设计、检测、运营、维护等所需的高素质应用型人才。该专业的毕业生将掌握高速轨道交通移动设备和城市轨道交通车辆设计、检测、运营、维护等所需的基础理论知识、机械设计与制造技术、信息化技术（数字化、网络化、智能化），具备较强的动手能力和岗位适应能力，能够扎根轨道交通行业，具备吃苦和奉献精神。国务院也印发了《中国制造2025》，以实施智能制造工程为核心部署全面推进实施制造强国战略，也预示着中国工业4.0时代的开启。由于我国高速铁路实现了从“追赶者”到“领跑者”的巨大跨越，不管是技术还是规模，均已是世界翘楚。但是，由于我国地缘辽阔，东西南北自然环境差异巨大，导致轨道交通运营面临复杂的环境条件，其安全性、可靠性、舒适性，以及绿色、低成本、高效益运行，如何实现智能检测与智能运维，会面临很多新问题。可以预见，未来10年，我国轨道交通行业对各类人才的需求将非常旺盛，毕业生主要就业领域包括国铁集团各铁路局、中车集团各企业、各城市轨道交通运营公司等。  2、人才需求情况  机械电子工程是以机械、微电子和计算机应用技术为三大支柱的新型边缘学科，它还涉及到控制论和信息科学。目前，随着机械制造、电子工程和计算机科学等技术的发展，人工智能应用逐步覆盖安防、医疗、金融、工业、交通等领域。在信息时代，社会生产力水平与科学技术水平发展迅速，社会呈现高速运转趋势，这促使机械电子技术迅速发展，在新的历史背景下，机械电子技术革新周期越来越短，其所创造的社会价值越来越大，逐渐呈现出模糊化、数字化、集成化、网络化等特征。  机械电子工程专业以力学、机械工程、电子科学与技术、控制科学与工程为主干学科，重点学习机电系统设计、控制系统设计等学科方向所需要的基础理论和专业知识;要求学生具备机械、电子、控制等学科的基本理论和知识，具有机械设计与制造、自动化设备以及生产系统的自动控制与检测、计算机应用技术等方面的基本技能;能在机电行业及相关领域从事机电一体化产品和系统的设计制造、研究开发、工程应用、运行管理等方面工作。  当今，世界高科技竞争和突破正在创造着新的生产方式和经济秩序，高新技术渗透到传统产业，引起传统产业的深刻变革。机电一体化技术正是这场新技术革命中产生的新兴领域，机电一体化产品的功能，除了精度、动力、快速性外，更需要自动化、柔性化、信息化、 智能化，逐步实现自适应、自控制、自组织、自管理，向智能化过渡。从典型的机电一体化产品来看，如：数控机床、加工中心、机器人和机械手等无一不是机械类、电子类、电脑类、电力电子类等技术集成融合成一体化，这必然需要机电一体化设备操作、维修、检测及管理的大量专业技术人员。为满足我国工业现代化发展对机械电子工程专业人才的需求，特别是陕西省制造业对专业人才的需求，根据教育部《普通高等学校本科专业设置管理规定》和陕西省十四五规划和2035远景目标纲要针对增强企业技术创新能力实施1155工程等文件要求，结合学校学科发展规划、应用技术型大学转型发展和师资队伍状况以及其他办学条件，我校充分调研，仔细论证，经过认真准备，特申请增设机械电子工程本科专业。  **三、专业筹建**  1.课程建设方面  多年以来，我校一直坚持开展“机械电子工程”方面的教学、科研及学科建设的工作。目前已开设机械设计制造及其自动化、车辆工程、电气工程及其自动化、通信工程、物联网工程、计算机等专业。并在机械、车辆、电气等专业课程体系中均设置如机械类、电工电子类、传感器与检测技术、机电传动与控制、计算机接口技术、自动化装置与仪器类、智能控制类等与机械电子工程密切相关的各类课程。机械与电气工程学院在2017年与2020年培育出“轨道交通信号与控制”、“车辆工程”两个省级一流专  业，2019年培育校级一流专业“机械设计制造及其自动化”、电气工程及其自动化两个；建成了“车辆工程”、“智能控制”、“传感器与自动检测技术”、“PLC技术及应用”、“信号与信号处理”、“微处理器原理及应用”、“机械原理”、“机械设计”等相关校级重点课程。  2.实训室建设方面  学校已建成PLC综合编程、数控、机械基础、传感器及检测技术、液压与气动技术、自动化生产线、工业自动化、无损检测、机器人、自动控制原理、电机控制、创新设计、信号与控制、工程训练等实验室或实训中心，同时还建成智能应用技术、人工智能、3D打印、电子技术、机电一体化等研究室；实验室总面积8949.5平方米，设备仪器总价值约为3911.54万元，实验条件完全可以满足机器人工程专业的教学要求。此外，学校还建成大学生创新实践教学基地1个、机械加工实训中心1个，电子装配实训中心2个。  3.实践教学方面  为了培养学生的综合应用能力，我们在第二、三、四、五、六学期每学期都安排了课程设计和综合实训，使学生的实践动手能力得到大幅度的提高，其中第二学期开设的机械测绘制图，第三、四学期开设的金工实习，使学生通过实训能获得机械制图员和车工、钳工、焊工等资格证书；第四学期开设的电工技术和电子技术实训，使学生获得中高级电工资格证书；第五-七学期开设课程设计使学生具有一定的设计技能。第六-七学期进行的机械加工综合实训，使学生具备普通加工设备和数控设备的操作技能。  为了深化实践教学，培养与巩固学生的动手能力，多年来我院与西安黄河机械厂、陕西重型机械集团、西安迪利捷机电科技发展有限公司、宝鸡桥梁机械厂、陕西重型机械集团、西宁特殊钢股份有限公司、中铁电气化铁路运营管理有限公司西延维管处延安电务段、中铁电气化铁路运营管理有限公司上海维管处杭州维管段、中铁电气化铁路运营管理有限公司上海维管处徐州维管段、西宁特殊钢集团有限公司、中铁电气化铁路运营管理有限公司上海维管处合肥维管段、中铁电气化铁路运营管理有限公司太原公司、中铁电气化铁路运营管理有限公司南昌维管段、陕西重型汽车有限公司、杭州杭港地铁有限公司、合肥城市轨道交通有限公司、中铁电气化铁路运营管理有限公司上海地铁维管段、咸阳昌安机电有限公司、宁波轨道交通集团运营分公司、兰州市轨道交通有限公司、陕西东方机械厂、西安利和博机械有限公司、西安亚奥农机股份有限公司、陕西惠延机械有限公司等单位建立了良好的校企合作关系，进行深度的岗前综合实训。   1. 师资队伍建设方面。   该专业师资队伍充足、教学资源丰富是我们能申办该专业的有力保证。在机械电子工程专业方向上已经拥有一支实力很强的教学团队，有教师15人，其中教授2人，副教授5人，高级职称占47％，硕士以上学位教师达到100％。他们大都来自教学、科研、工程技术一线，有着丰富的教学经验和实际工作能力，可以满足机械电子工程专业的理论教学和实践教学的需要。  综上所述，我校在机械电子专业方向的教学、科研、学科建设等方面，已经有了长期的积累和积淀，具备了开设“机械电子工程”专业的基础和条件。 |

4．增设专业人才培养方案

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **一、培养目标**  本专业立足学校轨道交通特色定位，培养德智体美劳全面发展，掌握机电工程方面的基本理论、基本知识以及现代机电一体化技术和工业控制技术，具有机电控制系统设计、检测与维修等专业能力，能从事机电设备系统及元件的研究、设计、开发，机电设备的运行管理与营销等工作，具有创新意识和创业精神的高素质应用型专门人才。  **二、培养要求及毕业要求**  **（一）培养目标**  本专业学生主要学习与机电工程相关的机械、电子、控制、计算机等方面的基本理论和基本知识，接受制图、机械设计、测试、机电系统控制等方面的基本训练，掌握机电系统测试与信号分析、机电系统及元件设计、分析，机电设备运行、管理等方面的基本能力。  毕业生应获得以下几方面的知识和能力：  1.热爱社会主义祖国，拥护中国共产党的领导，树立正确的人生观、世界观和价值观，具有良好的思想品德、社会公德和职业道德，整体素质优良；  2.掌握较扎实的数学、物理、力学等学科基础理论知识；  3.系统掌握本专业领域的机械、电子、控制、计算机等专业基础知识；  4.具有本专业必备的机电系统集成及智能化、机电液控制、信号处理与计算机应用等专业知识，并了解其学科前沿及发展趋势；  5.具备必要的制图、设计、计算、测试和基本工艺操作等基本技能；  6.具有较强的计算机、外语应用能力和一定的文献检索能力，并具备一定的人文、 艺术及其他社会科学基础素养；  7.具备较强的自学能力、创新意识和较高分析问题、解决问题的综合素质；  8.具有良好的心理素质和适应能力，掌握科学锻炼身体的基本技能，受到必要的军事训练，达到国家规定的大学生体育和军事训练合格标准。  **（二）毕业要求**  1. 工程知识  1.1 能运用数学、物理等自然科学知识描述机械工程问题。  1.2 能掌握机械工程问题的技术原理，制定技术路线和解决方案。  1.3 运用专业知识，完成机械产品设计、制造、维护和检修工作。  2. 问题分析  2.1 能基于专业知识识别机械工程技术问题。  2.2 能通过文献检索和学习，了解机械工程问题当前的研究现状。  2.3 能综合运用专业知识提出机械工程问题各种可能的解决方案。  3. 设计开发  3.1 能按照设计规范及标准完成机械工程的总体设计和零部件设计。  3.2 能根据实际需要制定产品的生产工艺流程。  4. 研究实验  4.1 能对机械工程应选用的材料以及设计方案进行论证，确定实验内容、方法和步骤。  4.2 能对机械工程系统制定实验方案、搭建实验系统、分析和处理实验数据、获取合理结论。  5. 使用工具  5.1 掌握机械设计、制造和自动控制的理论和开发工具，并理解其功能的局限性。  5.2 能够开发和选择适当的仪器、信息资源、工程工具和专业模拟软件，对机械工程问题进行分析、计算和设计。  6. 工程/社会  6.1 了解机械工程技术标准、知识产权、法律法规和行业产业政策。  6.2 能合理评价机械工程对社会的不利影响。  7. 环境/发展  7.1 了解与机械工程相关的政策和法规，树立环保和可持续发展意识。  7.2 能自觉采取措施，规避工程项目对环境的不良影响。  8. 职业规范  8.1 了解中国传统文化，树立正确的世界观、人生观、价值观。  8.2能正确面对困难、压力和挫折，具有积极进取、乐观向上和健康平和的心态。  8.3 诚信正直，遵守职业道德和规范，履行社会责任。  9. 个人/团队  9.1具有一定人际交往与组织管理能力。  9.2能独立完成团队分配的工作，与团队成员交流、协作。  9.3 具有一定的人际交往与组织管理能力、能独立完成团队分配工作，与团队成员交流、协作。  10.沟通交流  10.1 能以口头、书面、设计文本和图纸等方式与工程相关方交流，准确表达自己的观点，回应质疑，了解认识的差异。  10.2 具有一定的外语阅读和写作能力。  11. 项目管理  11.1 理解机械工程工程项目管理与经济决策方法。  11.2 能在设计、开发过程中运用工程管理和经济决策方法。  12. 终身学习  12.1 关注社会和专业的科技进步，具有自觉学习的意识。  12.2 勇于探索，学习和掌握新技术、新方法。  **三、学制与学位**  学制：四年  学位：工学学士   1. **毕业学分**   修完培养方案规定的180学分（必修课程164学分、选修课程16学分），其中课内理论教学121学分，实践教学和综合素质教育59学分。   1. **主干学科与主要课程**   1、主干学科：机械工程、电子科学与技术、控制科学与工程；  2、主要课程：机械制图、机械设计基础、电工基础、模拟电子技术、数字电子技术、机械测试与信号处理、自动控制原理、微机原理与接口技术、机电一体化原理、液压与气动技术、传感器与自动检测技术、机电传动控制、机电系统设计等。  **六、主要实践性教学环节**  大学物理实验、机械测绘制图、电装实训、机械原理课程设计、机械制造认识实习、机械设计课程设计、机械加工实训、PLC编程实训、机电传动与控制课程设计、智能制造与机器人运用实训、数控机床自控编程加工、金工实习、创新创业实践训练、生产实习、社会实践、毕业设计等。  **七、课程结构与学分比例**   |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 类别 | 教学内容 | | 课程性质 | | 学时 | | 学分 | 比例 | | 课  内  理  论  教  学 | 公共基础课 | | 必修 | | 564 | | 35 | 19.4% | | 学科基础课 | | 必修 | | 960 | | 61.5 | 34.2% | | 专业课 | | 必修 | | 208 | | 13 | 7.2% | | 专业（方向）模块 | 专业限选课程 | 限选 | | 72 | | 4.5 | 2.5% | | 专业任选课程 | 选修 | | 136 | | 7 | 3.9% | | 小计 |  | | | | 1940 | 121 | 67.2% | | 实践教学 | | 集中实践教学、课内实验、科技制作及社会实践 | | 必修 | |  | 51 | 28.4% | | 综合素质教育 | | 公共选修课Ⅱ  综合教育、个性发展等 | | 选修 | |  | 8 | 4.4% | | 总计 | | | | | | | 180 | 100％ |   **八、教学进程总体安排进程表**   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **类 别** | **性质** | **序**  **号** | **课程编码** | **课 程 名 称** | **学分** | | | | | **学时** | | | | | | | **考核方式** | | | | | | **按 学 年 及 学 期 分 配** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | **第一学年** | | | | | | | | | | | | **第二学年** | | | | | | | | | | | **第三学年** | | | | | | | | | | **第四学年** | | | | | | | | | **理论** | **实践** | | | | | | **理论** | | **实**  **践** | | | **考试** | | | | **考查** | | | | **1学期** | | | | | | **2学期** | | | | | | | | **3学期** | | | **4学期** | | | | | | **5学期** | | | | | | **6学期** | | | | **7学期** | | | | **8学期** | | | **每 学 期 学 时 数** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | **通识教育平台** | **公共必修**  **课程** | 1 | 10B01001 | 思想道德修养与法律基础 | 3 |  | | | | | | 48 | |  | | | √ | | | |  | | | | 48 | | | | | |  | | | | | | | |  | | |  | | | | | |  | | | | | |  | | | |  | | | |  | | | 2 | 10B01002 | 中国近现代史纲要 | 3 |  | | | | | | 48 | |  | | | √ | | | |  | | | |  | | | | | | 48 | | | | | | | |  | | |  | | | | | |  | | | | | |  | | | |  | | | |  | | | 3 | 10B01003 | 马克思主义基本原理概论 | 3 |  | | | | | | 48 | |  | | | √ | | | |  | | | |  | | | | | |  | | | | | | | | 48 | | |  | | | | | |  | | | | | |  | | | |  | | | |  | | | 4 | 10B01004 | 毛泽东思想和中国特色社会主义理论体系概论 | 3 | 2 | | | | | | 48 | | 32 | | | √ | | | |  | | | |  | | | | | |  | | | | | | | |  | | | 80 | | | | | |  | | | | | |  | | | |  | | | |  | | | 5 | 10B01005 | 安全教育和形势与政策 | 2 |  | | | | | | 32 | |  | | |  | | | | √ | | | | 8 | | | | | | 4 | | | | | | | | 4 | | | 4 | | | | | | 4 | | | | | | 4 | | | | 4 | | | |  | | | 6 | 10B01006 | 大学生健康教育 | 2 |  | | | | | | 32 | |  | | |  | | | | √ | | | | 16 | | | | | | 16 | | | | | | | |  | | |  | | | | | |  | | | | | |  | | | |  | | | |  | | | 7 | 11B01001 | 军事理论 | 2 |  | | | | | | 36 | |  | | |  | | | | √ | | | | 36 | | | | | |  | | | | | | | |  | | |  | | | | | |  | | | | | |  | | | |  | | | |  | | | 8 | 09B01001 | 大学英语A1 | 3.5 | 0.5 | | | | | | 56 | | 8 | | | √ | | | |  | | | | 64 | | | | | |  | | | | | | | |  | | |  | | | | | |  | | | | | |  | | | |  | | | |  | | | 9 | 09B01002 | 大学英语A2 | 3.5 | 0.5 | | | | | | 56 | | 8 | | | √ | | | |  | | | |  | | | | | | 64 | | | | | | | |  | | |  | | | | | |  | | | | | |  | | | |  | | | |  | | | 10 | 09B01003 | 大学英语A3 | 2.5 | 0.5 | | | | | | 40 | | 8 | | | √ | | | |  | | | |  | | | | | |  | | | | | | | | 48 | | |  | | | | | |  | | | | | |  | | | |  | | | |  | | | 11 | 09B01004 | 大学英语A4 | 2.5 | 0.5 | | | | | | 40 | | 8 | | | √ | | | |  | | | |  | | | | | |  | | | | | | | |  | | | 48 | | | | | |  | | | | | |  | | | |  | | | |  | | | 12 | 09B01005 | 体育A1 |  | 1 | | | | | |  | | 26 | | |  | | | | √ | | | | 26 | | | | | |  | | | | | | | |  | | |  | | | | | |  | | | | | |  | | | |  | | | |  | | | 13 | 09B01006 | 体育A2 |  | 1 | | | | | |  | | 40 | | |  | | | | √ | | | |  | | | | | | 40 | | | | | | | |  | | |  | | | | | |  | | | | | |  | | | |  | | | |  | | | 14 | 09B01007 | 体育A3 |  | 1 | | | | | |  | | 40 | | |  | | | | √ | | | |  | | | | | |  | | | | | | | | 40 | | |  | | | | | |  | | | | | |  | | | |  | | | |  | | | 15 | 09B01008 | 体育A4 |  | 1 | | | | | |  | | 40 | | |  | | | | √ | | | |  | | | | | |  | | | | | | | |  | | | 40 | | | | | |  | | | | | |  | | | |  | | | |  | | | 16 | 04B01001 | 大学计算机基础 |  | 1.5 | | | | | |  | | 32 | | |  | | | | √ | | | | 32 | | | | | |  | | | | | | | |  | | |  | | | | | |  | | | | | |  | | | |  | | | |  | | | 17 | 06B01001 | 艺术概论 | 1 |  | | | | | | 32 | |  | | |  | | | | √ | | | |  | | | | | | 32 | | | | | | | |  | | |  | | | | | |  | | | | | |  | | | |  | | | |  | | | 18 | 11B01002 | 劳动教育 | 1 |  | | | | | | 32 | |  | | |  | | | | √ | | | |  | | | | | |  | | | | | | | |  | | | 32 | | | | | |  | | | | | |  | | | |  | | | |  | | | **公共选修课程** | 1 |  | 人文社科类 | 8 |  | | | | | | 128 | |  | | |  | | | |  | | | |  | | | | | |  | | | | | | | |  | | |  | | | | | | 64 | | | | | |  | | | | 64 | | | |  | | | 2 | 自然科学类 | | 3 | 艺术体育类 | | 4 | 创新创业类 | | **小计** | | | | 38 | 9.5 | | | | | | 612 | | 242 | | |  | | | |  | | | | 230 | | | | | | 172 | | | | | | | | 140 | | | 172 | | | | | | 68 | | | | | | 4 | | | | 68 | | | |  | | | **类 别** | **性质** | **序**  **号** | **课程编码** | **课 程 名 称** | **学分** | | | | | | | **学时** | | | | | **考核方式** | | | | | | | | **按 学 年 及 学 期 分 配** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | **第一学年** | | | | | | | | | | | | | **第二学年** | | | | | | | | | | | **第三学年** | | | | | | | | **第四学年** | | | | | | | | **理论** | **实践** | | | | | | **理论** | | | **实**  **践** | | **考试** | | | | **考查** | | | | **1学期** | | | | **2学期** | | | | | | | | | **3学期** | | | | | | | **4学期** | | | | **5学期** | | | | | **6学期** | | | **7学期** | | | | **8学期** | | | | **每 学 期 学 时 数** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | **专业教育平台** | **学科基础课程** | 1 | 09B01009 | 高等数学A1 | 5 |  | | | | | | 80 | | |  | | √ | | | |  | | | | 80 | | | |  | | | | | | | | |  | | | | | | |  | | | |  | | | | |  | | |  | | | |  | | | | 2 | 09B01010 | 高等数学A2 | 4.5 |  | | | | | | 72 | | |  | | √ | | | |  | | | |  | | | | 72 | | | | | | | | |  | | | | | | |  | | | |  | | | | |  | | |  | | | |  | | | | 3 | 09B01013 | 大学物理A1 | 3.5 |  | | | | | | 56 | | |  | | √ | | | |  | | | |  | | | | 56 | | | | | | | | |  | | | | | | |  | | | |  | | | | |  | | |  | | | |  | | | | 4 | 09B01014 | 大学物理A2 | 3.5 |  | | | | | | 56 | | |  | | √ | | | |  | | | |  | | | |  | | | | | | | | | 56 | | | | | | |  | | | |  | | | | |  | | |  | | | |  | | | | 5 | 09B09001 | 大学物理实验A1 | 1 |  | | | | | |  | | | 32 | |  | | | | √ | | | |  | | | | 32 | | | | | | | | |  | | | | | | |  | | | |  | | | | |  | | |  | | | |  | | | | 6 | 09B09002 | 大学物理实验A2 | 1 |  | | | | | |  | | | 32 | |  | | | | √ | | | |  | | | |  | | | | | | | | | 32 | | | | | | |  | | | |  | | | | |  | | |  | | | |  | | | | 7 | 09B01015 | 线性代数 | 2 |  | | | | | | 36 | | |  | |  | | | |  | | | |  | | | |  | | | | | | | | | 36 | | | | | | |  | | | |  | | | | |  | | |  | | | |  | | | | 8 | 09B01016 | 概率论与数理统计 | 2 |  | | | | | | 36 | | |  | |  | | | | √ | | | |  | | | |  | | | | | | | | |  | | | | | | | 36 | | | |  | | | | |  | | |  | | | |  | | | | 9 | 02B03001 | 画法几何 | 3 |  | | | | | | 48 | | |  | | √ | | | |  | | | | 48 | | | |  | | | | | | | | |  | | | | | | |  | | | |  | | | | |  | | |  | | | |  | | | | 10 | 02B03002 | 轨道交通概论 | 2 |  | | | | | | 32 | | |  | |  | | | | √ | | | | 32 | | | |  | | | | | | | | |  | | | | | | |  | | | |  | | | | |  | | |  | | | |  | | | | 10 | 02B03003 | 机械制图 | 3 |  | | | | | | 48 | | |  | | √ | | | |  | | | |  | | | | 48 | | | | | | | | |  | | | | | | |  | | | |  | | | | |  | | |  | | | |  | | | | 11 | 02B03004 | 计算机辅助制图（CAD） |  | 2 | | | | | |  | | | 32 | |  | | | | √ | | | |  | | | | 32 | | | | | | | | |  | | | | | | |  | | | |  | | | | |  | | |  | | | |  | | | | 12 | 04B03014 | 程序设计基础（C++） | 2 | 1 | | | | | | 32 | | | 16 | | √ | | | |  | | | |  | | | |  | | | | | | | | | 48 | | | | | | |  | | | |  | | | | |  | | |  | | | |  | | | | 13 | 02B03006 | 理论力学 | 4 |  | | | | | | 64 | | |  | | √ | | | |  | | | |  | | | |  | | | | | | | | | 64 | | | | | | |  | | | |  | | | | |  | | |  | | | |  | | | | 14 | 02B03007 | 材料力学 | 3.5 | 0.5 | | | | | | 56 | | | 8 | | √ | | | |  | | | |  | | | |  | | | | | | | | |  | | | | | | | 64 | | | |  | | | | |  | | |  | | | |  | | | | 16 | 02B03008 | 机械原理 | 3.5 | 0.5 | | | | | | 56 | | | 8 | | √ | | | |  | | | |  | | | |  | | | | | | | | |  | | | | | | | 64 | | | |  | | | | |  | | |  | | | |  | | | | 19 | 02B93009 | 工程材料及成型技术 | 2.5 | 0.5 | | | | | | 40 | | | 8 | | √ | | | |  | | | |  | | | |  | | | | | | | | |  | | | | | | | 48 | | | |  | | | | |  | | |  | | | |  | | | | 17 | 02B03010 | 互换性与测量技术 | 1.5 | 0.5 | | | | | | 24 | | | 8 | |  | | | | √ | | | |  | | | |  | | | | | | | | |  | | | | | | |  | | | | 32 | | | | |  | | |  | | | |  | | | | 18 | 02B03011 | 机械设计 | 3.5 | 0.5 | | | | | | 56 | | | 8 | | √ | | | |  | | | |  | | | |  | | | | | | | | |  | | | | | | |  | | | | 64 | | | | |  | | |  | | | |  | | | | 20 | 02B03012 | 液压气压传动与控制 | 2.5 | 0.5 | | | | | | 40 | | | 8 | |  | | | | √ | | | |  | | | |  | | | | | | | | |  | | | | | | |  | | | | 48 | | | | |  | | |  | | | |  | | | | 21 | 02B03013 | 电工基础 | 2.5 | 0.5 | | | | | | 40 | | | 8 | | √ | | | |  | | | |  | | | |  | | | | | | | | |  | | | | | | |  | | | | 48 | | | | |  | | |  | | | |  | | | | 22 | 02B03014 | 模拟电子技术 | 3 |  | | | | | | 48 | | |  | | √ | | | |  | | | |  | | | |  | | | | | | | | |  | | | | | | |  | | | |  | | | | | 48 | | |  | | | |  | | | | 23 | 02B93015 | PLC原理及应用 | 2 |  | | | | | | 32 | | |  | |  | | | | √ | | | |  | | | |  | | | | | | | | |  | | | | | | |  | | | |  | | | | | 32 | | |  | | | |  | | | | **小计** | | | | 61.5 | 6 | | | | | | 960 | | | 160 | |  | | | |  | | | | 160 | | | | 240 | | | | | | | | | 236 | | | | | | | 212 | | | | 192 | | | | | 80 | | |  | | | |  | | | | **类 别** | **性质** | **序**  **号** | **课程编码** | **课 程 名 称** | **学分** | | | | | | | **学时** | | | | | **考核方式** | | | | | | **按 学 年 及 学 期 分 配** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | **第一学年** | | | | | | | | | | | **第二学年** | | | | | | | | | | | | | | **第三学年** | | | | | | | | **第四学年** | | | | | | | | | **理论** | | **实践** | | | | | **理论** | | | **实**  **践** | | **考试** | | | | **考查** | | **1学期** | | | | | **2学期** | | | | | | **3学期** | | | | | | | | **4学期** | | | | | | **5学期** | | | | **6学期** | | | | **7学期** | | | | | **8学期** | | | | **每 学 期 学 时 数** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | **专业教育平台** | **专业核心**  **课程** | 1 | 02B05201 | 控制工程基础 | 2.5 | | 0.5 | | | | | 40 | | | 8 | | √ | | | |  | |  | | | | |  | | | | | |  | | | | | | | |  | | | | | | 48 | | | |  | | | |  | | | | |  | | | | 2 | 02B05202 | 机电传动控制 | 2.5 | | 0.5 | | | | | 40 | | | 8 | | √ | | | |  | |  | | | | |  | | | | | |  | | | | | | | |  | | | | | |  | | | | 48 | | | |  | | | | |  | | | | 3 | 02B05203 | 数字电子技术 | 2 | |  | | | | | 32 | | |  | | √ | | | |  | |  | | | | |  | | | | | |  | | | | | | | |  | | | | | |  | | | | 32 | | | |  | | | | |  | | | | 4 | 02B90504 | 数控技术及应用 | 3.5 | | 0.5 | | | | | 56 | | | 8 | | √ | | | |  | |  | | | | |  | | | | | |  | | | | | | | |  | | | | | |  | | | |  | | | | 64 | | | | |  | | | | 5 | 02B90505 | 机电一体化原理 | 2.5 | | 0.5 | | | | | 40 | | | 8 | | √ | | | |  | |  | | | | |  | | | | | |  | | | | | | | |  | | | | | |  | | | |  | | | | 48 | | | | |  | | | | **小计** | | | | 13 | | 2 | | | | | 208 | | | 32 | |  | | | |  | |  | | | | |  | | | | | |  | | | | | | | |  | | | | | | 48 | | | | 80 | | | | 112 | | | | |  | | | | **类别** | **性质** | **序**  **号** | **课程编码** | **课 程 名 称** | **学分** | | | | **学时** | | | | | | | **考核方式** | | | | | | | **按 学 年 及 学 期 分 配** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | **第一学年** | | | | | | | | | | | | | | **第二学年** | | | | | | | | | | | **第三学年** | | | | | | | | **第四学年** | | | | | | | | |  |  |  |  |  | **理论** | **实践** | | | | | **理论** | | | | **实**  **践** | | | | **考试** | | **考查** | | | | | **1学期** | | | | | | **2学期** | | | | | | | | **3学期** | | | | **4学期** | | | | | | **5学期** | | | **6学期** | | | | | | **7学期** | | | | **8学期** | | **每 学 期 学 时 数** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | **专业教育平台** | **专业方向课程** | 1 | 02B06201 | 机电系统设计 | 1.5 | 0.5 | | | | | 24 | | | | 8 | | | | √ | |  | | | | |  | | | | | |  | | | | | | | |  | | | |  | | | | | |  | | | 32 | | | | | |  | | | |  | | 2 | 02B06202 | 机械测试与信号处理 | 1.5 | 0.5 | | | | | 24 | | | | 8 | | | |  | | √ | | | | |  | | | | | |  | | | | | | | |  | | | |  | | | | | |  | | | 32 | | | | | |  | | | |  | | 3 | 02B06203 | 机械工程测试技术 | 1.5 | 0.5 | | | | | 24 | | | | 8 | | | |  | | √ | | | | |  | | | | | |  | | | | | | | |  | | | |  | | | | | |  | | | 32 | | | | | |  | | | |  | | 4 | 02B06204 | 微机原理与接口技术 | 1.5 | 0.5 | | | | | 24 | | | | 8 | | | |  | | √ | | | | |  | | | | | |  | | | | | | | |  | | | |  | | | | | |  | | |  | | | | | | 32 | | | |  | | 5 | 02B06205 | 自动控制原理 | 1.5 | 0.5 | | | | | 24 | | | | 8 | | | | √ | |  | | | | |  | | | | | |  | | | | | | | |  | | | |  | | | | | |  | | |  | | | | | | 32 | | | |  | | 6 | 02B06206 | 机器人技术 | 1.5 | 0.5 | | | | | 24 | | | | 8 | | | |  | | √ | | | | |  | | | | | |  | | | | | | | |  | | | |  | | | | | |  | | |  | | | | | | 32 | | | |  | | **小计** | | | | 4.5 | 1.5 | | | | | 72 | | | | 24 | | | |  | |  | | | | |  | | | | | |  | | | | | | | |  | | | |  | | | | | |  | | | 64 | | | | | | 32 | | | |  | | **类 别** | **性质** | **序**  **号** | **课程编码** | **课 程 名 称** | **学分** | | | | | | | | **学时** | | | | | | | **考核方式** | | | | | | | **按 学 年 及 学 期 分 配** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | **第一学年** | | | | | | | | | | | | **第二学年** | | | | | | | | **第三学年** | | | | | | | | **第四学年** | | | | | | | | | | **理论** | | | **实践** | | | | | **理论** | | **实**  **践** | | | | | **考试** | | **考查** | | | | | **1学期** | | | | | | **2学期** | | | | | | **3学期** | | | | **4学期** | | | | **5学期** | | | | **6学期** | | | | **7学期** | | | | | **8学期** | | | | | **每 学 期 学 时 数** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | **专业教育平台** | **专业任选课程** | 1 | 02B00201 | 单片机原理及应用 | 1.5 | | | 0.5 | | | | | 24 | | 8 | | | | |  | | √ | | | | |  | | | | | |  | | | | | |  | | | |  | | | | 32 | | | |  | | | |  | | | | |  | | | | | 2 | 02B00202 | 传感器与检测技术 | 1.5 | | | 0.5 | | | | | 24 | | 8 | | | | |  | | √ | | | | |  | | | | | |  | | | | | |  | | | |  | | | | 32 | | | |  | | | |  | | | | |  | | | | | 3 | 02B00203 | 无损检测技术 | 1.5 | | | 0.5 | | | | | 24 | | 8 | | | | |  | | √ | | | | |  | | | | | |  | | | | | |  | | | |  | | | | 32 | | | |  | | | |  | | | | |  | | | | | 4 | 02B00204 | 3D打印技术 | 1.5 | | | 0.5 | | | | | 24 | | 8 | | | | |  | | √ | | | | |  | | | | | |  | | | | | |  | | | |  | | | |  | | | | 32 | | | |  | | | | |  | | | | | 5 | 02B00205 | 人机工程 | 2 | | |  | | | | | 32 | |  | | | | |  | | √ | | | | |  | | | | | |  | | | | | |  | | | |  | | | |  | | | | 32 | | | |  | | | | |  | | | | | 6 | 02B00206 | 科技文献检索 | 1.5 | | | 0.5 | | | | | 24 | | 8 | | | | |  | | √ | | | | |  | | | | | |  | | | | | |  | | | |  | | | |  | | | | 32 | | | |  | | | | |  | | | | | 7 | 02B96007 | 计算机辅助三维设计 | 1.5 | | | 0.5 | | | | | 24 | | 8 | | | | |  | | √ | | | | |  | | | | | |  | | | | | |  | | | |  | | | |  | | | | 32 | | | |  | | | | |  | | | | | 8 | 02B96008 | 专业英语 | 2 | | |  | | | | | 32 | |  | | | | |  | | √ | | | | |  | | | | | |  | | | | | |  | | | |  | | | |  | | | |  | | | | 32 | | | | |  | | | | | **小计** | | | | 7 | | | 1 | | | | | 136 | | 24 | | | | |  | |  | | | | |  | | | | | |  | | | | | |  | | | |  | | | | 32 | | | | 64 | | | | 64 | | | | |  | | | | | **类 别** | **性质** | **序**  **号** | **课程编码** | **课 程 名 称** | **学分** | | | | | | | **学时** | | | | | | **考核方式** | | | | | | **按 学 年 及 学 期 分 配** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | **第一学年** | | | | | | | | | | | | **第二学年** | | | | | | | | | | | **第三学年** | | | | | | | | **第四学年** | | | | | | | | | | **理论** | | | **实践** | | | | **理论** | | | **实**  **践** | | | **考试** | | | **考查** | | | **1学期** | | | | | | **2学期** | | | | | | **3学期** | | | | | **4学期** | | | | | | **5学期** | | | | **6学期** | | | | **7学期** | | | | | **8学期** | | | | | **每 学 期 学 时 数** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | **创新创业教育平台** | **创新创业理论课程** | 1 | 13B07001 | 大学生创新创业教育 | 2 | | |  | | | | 32 | | |  | | |  | | |  | | |  | | | | | |  | | | | | | 32 | | | | |  | | | | | |  | | | |  | | | |  | | | | |  | | | | | 2 | 13B07002 | 大学生科研训练与论文写作指导 | 2 | | |  | | | | 32 | | |  | | |  | | |  | | |  | | | | | |  | | | | | |  | | | | | 32 | | | | | |  | | | |  | | | |  | | | | |  | | | | | 3 | 12B08001 | 就业指导 | 1 |  | | | | | | 16 | | |  | | |  | | |  | | |  | | | | | |  | | | | | |  | | | | |  | | | | | |  | | | | 16 | | | |  | | | | |  | | | | | 4 | 12B08002 | 职业规划 | 1 |  | | | | | | 16 | | |  | | |  | | |  | | | 16 | | | | | |  | | | | | |  | | | | |  | | | | | |  | | | |  | | | |  | | | | |  | | | | | **创新创业实践课程** | 1 |  | 创新创业实践 |  | 2 | | | | | |  | | |  | | |  | | |  | | |  | | | | | | 学生参与学术科技创新活动、专业技能比赛（竞赛）、创新创业实践活动等 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | | | | **小计** | | | | 6 | 2 | | | | | | 96 | | |  | | |  | | |  | | | 16 | | | | | |  | | | | | | 32 | | | | | 32 | | | | | |  | | | | 16 | | | |  | | | | |  | | | |   **九、集中实践教学环节**   |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **类 别** | **性质** | **序号** | **课程**  **代码** | **课程名称** | **实践学分** | **学期安排** | | | | | | | | | **1学期** | **2学期** | **3学期** | **4学期** | **5学期** | **6学期** | **7学期** | **8学期** | | **实践教育平台** | **集中实践课程** | 1 | 00B0J001 | 入学教育 | 1 | 1周 |  |  |  |  |  |  |  | | 2 | 11B9J001 | 军训 | 2 | 2周 |  |  |  |  |  |  |  | | 3 | 02B0J202 | 机械测绘制图 | 2 |  | 2周 |  |  |  |  |  |  | | 4 | 02B0J203 | 劳动教育 | 1 | 在校期间 | | | | | | | | | 5 | 12B0J002 | 金工实训 | 2 |  |  | 2周 |  |  |  |  |  | | 6 | 12B0J001 | 电装实训 | 1 |  |  |  | 1周 |  |  |  |  | | 7 | 02B0J004 | 《机械原理》课程作业 | 1 |  |  |  | 1周 |  |  |  |  | | 8 | 02B9J201 | 机械制造认识实习 | 1 |  |  |  |  | 1周 |  |  |  | | 9 | 02B0J005 | 《机械设计》课程设计 | 2 |  |  |  |  | 2周 |  |  |  | | 10 | 02B0J006 | 机械加工实训 | 1 |  |  |  |  |  | 1周 |  |  | | 11 | 02B0J007 | PLC编程实训 | 1 |  |  |  |  |  | 1周 |  |  | | 12 | 02B0J201 | 数控机床自控编程加工  金工实习 | 2 |  |  |  |  |  |  | 2周 |  | | 13 | 02B0J202 | 生产实习 | 2 |  |  |  |  |  |  |  | 2周 | | 14 | 02B0J203 | 社会实践 | 2 | 在校期间 | | | | | | | | | 15 | 02B0J204 | 毕业设计 | 7 |  |  |  |  |  |  |  | 14周 |   **十、毕业要求与课程及教学活动关联矩阵**   | **毕业要求**  **课程名称** | **毕业要求**  **1** | **毕业要求**  **2** | **毕业要求**  **3** | **毕业要求**  **4** | **毕业要求**  **5** | **毕业要求**  **6** | **毕业要求**  **7** | **毕业要求**  **8** | **毕业要求**  **9** | **毕业要求10** | **毕业要求11** | **毕业要求12** | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 思想道德修养与法律基础 |  |  | M |  |  | L | M |  |  |  |  |  | | 中国近现代史纲要 |  |  |  |  |  |  |  | H |  |  |  |  | | 马克思主义基本原理 |  |  |  |  |  |  |  | M |  |  |  |  | | 毛泽东思想和中国特色社会主义理论体系概论 |  |  |  |  |  |  |  | H |  |  |  |  | | 安全教育和形势与政策 |  |  |  |  |  | L | H | M |  | M |  | L | | 大学生健康教育 |  |  |  |  |  |  |  | M |  |  |  |  | | 军事理论 |  |  |  |  |  |  |  | L | L |  |  |  | | 大学英语A1-A4 |  |  |  |  |  |  |  |  |  | H |  | L | | 体育A1-A4 |  |  |  |  |  |  |  |  | M |  |  |  | | 大学生计算机基础 |  |  |  |  | H |  |  |  |  |  |  | L | | 艺术概论 |  |  |  |  |  |  |  | M |  |  |  |  | | 劳动教育 |  |  |  |  |  |  |  |  | M |  |  |  | | 高等数学A1-A2 | H | H |  |  |  |  |  |  |  |  |  |  | | 大学物理A1-A2 | H | M |  |  |  |  |  |  |  |  |  |  | | 大学物理实验A1-A2 | L | M |  |  |  |  |  |  |  |  |  |  | | 线性代数 | M | H |  |  |  |  |  |  |  |  |  |  | | 概率论与数理统计 | L | M |  | M |  |  |  |  |  |  |  |  | | 画法几何 | M |  | M |  |  |  |  |  |  |  |  |  | | 机械制图 | H | H | H | H | M |  |  |  |  |  |  | H | | 计算机辅助制图（CAD） | M |  | H | H | M |  |  | M |  |  |  | H | | 程序设计基础（C++） |  |  | H | H |  |  |  |  |  |  |  | M | | 理论力学 | H | H | H |  |  |  |  |  |  |  |  |  | | 材料力学 | H | H | H |  |  |  |  |  |  |  |  |  | | 机械原理 | H | H | M | M |  |  |  |  |  |  |  | H | | 工程材料及成型技术 | M |  | M | M |  |  |  |  |  |  |  |  | | 互换性与测量技术 |  | M | H | M | H |  |  |  |  |  |  |  | | 机械设计 | H | M | M | H | H |  |  |  |  |  |  |  | | 液压气压传动与控制 |  | M |  | M | H |  |  |  |  |  |  |  | | 电工基础 | M |  | M | M | H |  |  |  |  |  |  |  | | 模拟电子技术 | H | H | H | H | H | M |  |  |  |  |  | H | | 控制工程基础 | L |  |  | L |  |  |  |  |  |  |  |  | | 机电传动控制 |  |  |  | M |  |  |  |  |  |  |  |  | | 数控技术及应用 | L |  |  | M |  |  |  |  |  |  |  |  | | 机电一体化原理 | L |  |  | H |  |  |  |  |  |  |  |  | | PLC 原理及应用 |  |  | H | M | M |  |  |  |  |  |  | M | | 计算机辅助三维设计 | H |  | H |  | H |  |  |  |  |  |  | M | | 数字电子技术 | H | H | H | H | H | M |  |  |  |  |  | H | | 传感器与检测技术 |  |  | H | M | M |  |  |  |  |  |  |  | | 机械测试与信号处理 |  |  | H | M | M |  |  |  |  |  |  |  | | 机电系统设计 | H |  | H | M |  |  |  | L |  |  |  |  | | 单片机原理及应用 |  | M | M | H | H |  |  |  |  |  |  |  | | 无损检测技术 |  |  | L | M | M |  |  |  |  |  |  |  | | 3D打印技术 |  |  | M | M | M | L |  |  |  |  |  |  | | 自动控制原理 |  |  |  |  |  | M | H |  |  |  | L |  | | 机器人技术 |  |  |  |  |  | H |  |  | M |  | H |  | | 机械工程测试技术 |  |  |  |  | L |  |  |  |  | M |  | M | | 人机工程 | L |  | L | L |  |  |  |  |  |  |  |  | | 科技文献检索 |  |  |  |  | L |  |  |  |  | M |  | M | | 专业英语 |  |  |  |  |  |  |  |  |  | H |  | M | | 大学生创新创业教育 |  |  |  |  |  |  |  | M | H |  |  | H | | 大学生科研训练与论文写作指导 |  |  |  |  |  |  |  | M |  | M |  | M | | 就业指导 |  |  |  |  |  |  |  |  | H |  |  | M | | 职业规划 |  |  |  |  |  | M | M |  |  |  |  | H | | 创新创业实践 |  |  |  |  |  |  |  |  | M | M |  | H | | 入学教育 |  |  |  |  |  | M |  |  |  |  |  | H | | 军训 |  |  |  |  |  |  |  | M | H |  |  | H | | 机械测绘制图 | L |  |  | L |  |  |  |  |  |  |  |  | | 金工实训 |  | H |  | H |  | M |  |  | L |  |  |  | | 电装实训 |  |  | M | H |  |  |  |  |  |  |  |  | | 《机械原理》课程设计 | H | H | M | M |  |  |  |  |  |  |  |  | | 机械制造认识实习 |  | H |  |  |  |  |  |  |  |  |  | M | | 《机械设计》课程设计 | H | H |  |  |  |  |  |  |  |  |  | M | | PLC编程实训 |  |  | M | M | M |  |  |  |  |  |  | L | | 数控机床自控编程加工 |  | H |  | M |  | L |  |  | L |  |  |  | | 社会实践 |  |  |  |  |  | M |  | M | H | H |  |  | | 生产实习 | M | M | M | L | L | H | L | M | H | H | M | M | | 毕业设计 | H | H | H | H |  |  |  |  |  |  |  | H |   (H表示高度关联，M表示中度关联，L表示低度关联) |

1. 专业主要带头人简介（一）

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 姓名 | 贾雄伟 | | | 性 别 | 男 | | 专业技术职务 | | 副教授 | | 第一学历 | | | 本科 |
| 出生年月 | 1985.10 | | 行政职务 | | 教研室主任 | | 最后学历 | | | 研究生 |
| 第一学历和最后学历毕业时间、学校、专业 | | | | 长春大学，2008.07，机械工程及其自动化（本科）；  长春理工大学，2011.04，机械制造及其自动化（硕士）。 | | | | | | | | | | |
| 主要从事工作与  研究方向 | | | | 数字化产品设计与制造 | | | | | | | | | | |
| 本人近三年的主要工作成就 | | | | | | | | | | | | | | |
| 在国内外重要学术刊物上发表论文共 6 篇；出版专著（译著等） 0 部。 | | | | | | | | | | | | | | |
| 获教学科研成果奖共 0 项；其中：国家级 0 项，省部级 0 项。 | | | | | | | | | | | | | | |
| 目前承担教学科研项目共 2 项；其中：国家级项目 1 项，省部级项目 1 项。 | | | | | | | | | | | | | | |
| 近三年拥有教学科研经费共 12 万元，年均 4 万元。 | | | | | | | | | | | | | | |
| 近三年给学生授课（理论教学）共 384 学时；指导学生毕业实习共 21 人次。 | | | | | | | | | | | | | | |
| 最具代表性的教学科研成果 | | 序号 | 成果名称 | | | 等级及签发单位、时间 | | | | | | 本人署名位次 | | |
| 1 | 基于极大值模糊熵的地铁隧道安全检测台异常振动监测 | | | 自动化与仪器仪表  2021(01):112-114. | | | | | | 第一作者 | | |
| 2 | 基于机器视觉的地铁检测台机械结构优化设计方法 | | | 自动化与仪器仪表  2020(08):88-91. | | | | | | 第一作者 | | |
| 3 | 发明专利：一种机械生产用加工夹具 | | | 国家专利局，202年4月15日，CN113211129B | | | | | | 第一发明人 | | |
| 目前承担的主要教学科研项目 | | 序号 | 项目名称 | | | 项目来源 | | 起讫时间 | | 经费 | | 本人承担工作 | | |
| 1 | 德育为先、实践为重、创新为本的金工类课程教学方法研究 | | | 教育部 | | 2021-2023 | | 10 | | 第一完成人 | | |
| 2 | 基于宁波地铁数字化资源平台的开发 | | | 陕西省教育厅 | | 2019-2020 | | 2 | | 第一完成人 | | |
| 目前承担的主要教学工作 | | 序号 | 课程名称 | | | 授课对象 | | 人数 | 学时 | 课程性质 | | | 授课时间 | |
| 1 | 材料力学 | | | 本科 | | 121 | 64 | 必修 | | | 每年 | |
| 2 | 数控技术及应用 | | | 本科 | | 101 | 64 | 必修 | | | 每年 | |
| 3 | 机械制造技术基础 | | | 本科 | | 128 | 48 | 必修 | | | 每年 | |
| 教学管理部门审核意见 | | | 情况属实  签章： | | | | | | | | | | | |

专业主要带头人简介（二）

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 姓名 | 闫树军 | | | 性 别 | 男 | | 专业技术职务 | | 副教授 | | 第一学历 | | | 本科 |
| 出生年月 | 1980.02 | | 行政职务 | | 教研室主任 | | 最后学历 | | | 研究生 |
| 第一学历和最后学历毕业时间、学校、专业 | | | | 吉林农业大学，2001.09，农业机械化及其自动化（本科）；  昆明理工大学，2009.09，机械设计理论（硕士）。 | | | | | | | | | | |
| 主要从事工作与  研究方向 | | | | 机械设计及机构创新 | | | | | | | | | | |
| 本人近三年的主要工作成就 | | | | | | | | | | | | | | |
| 在国内外重要学术刊物上发表论文共 6 篇；出版专著（译著等） 0 部。 | | | | | | | | | | | | | | |
| 获教学科研成果奖共 0 项；其中：国家级 0 项，省部级 0 项。 | | | | | | | | | | | | | | |
| 目前承担教学科研项目共 5 项；其中：国家级项目 0 项，省部级项目 2 项。 | | | | | | | | | | | | | | |
| 近三年拥有教学科研经费共 10 万元，年均 3.3 万元。 | | | | | | | | | | | | | | |
| 近三年给学生授课（理论教学）共 428 学时；指导学生毕业实习共 20 人次。 | | | | | | | | | | | | | | |
| 最具代表性的教学科研成果 | | 序号 | 成果名称 | | | 等级及签发单位、时间 | | | | | | 本人署名位次 | | |
| 1 | 基于棉花秸秆炭的高品质生物质炭化炉设计 | | | 农业工程,2020,10(09):98-103. | | | | | | 第一作者 | | |
| 2 | 普通轮式拖拉机抬升装置的设计与研究 | | | 农机化研究  2017,39(08):252-255 | | | | | | 第一作者 | | |
| 3 | 棉秆炭制备的多目标优化研究 | | | 林产化学与工业  2017,37(04):81-88 | | | | | | 通讯作者 | | |
| 目前承担的主要教学科研项目 | | 序号 | 项目名称 | | | 项目来源 | | 起讫时间 | | 经费 | | 本人承担工作 | | |
| 1 | 南疆棉花全面机械采收的合理性调研 | | | 新疆兵团科协项目 | | 2016-2018 | | 5 | | 第一完成人 | | |
| 2 | 科技信息企业推广应用服务合作项目 | | | 中国科协子项目 | | 2017-2019 | | 12 | | 第一完成人 | | |
| 目前承担的主要教学工作 | | 序号 | 课程名称 | | | 授课对象 | | 人数 | 学时 | 课程性质 | | | 授课时间 | |
| 1 | 材料力学 | | | 本科 | | 278 | 64 | 必修 | | | 每年 | |
| 2 | 液压与气动技术 | | | 本科 | | 180 | 48 | 必修 | | | 每年 | |
| 3 | 科技文献检索 | | | 本科 | | 180 | 32 | 选修 | | | 每年 | |
| 教学管理部门审核意见 | | | 情况属实  签章： | | | | | | | | | | | |

专业主要带头人简介（三）

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 姓名 | 杨利花 | | | 性别 | 女 | | 专业技术  职务 | 副教授 | | | 第一  学历 | 本科 | |
| 出生  年月 | 1975年 2 月 | | 行政职务 | 无 | | | 最后  学历 | 博士研究生 | |
| 第一学历和最后学历毕业时间、学校、专业 | | | | 第一学历：1997年7月毕业于兰州交通大学机械制造工艺与设备专业  最后学历：2009年6月毕业于西安交通大学机械工程专业 | | | | | | | | | |
| 主要从事工作与  研究方向 | | | | 从事机械电子工程、飞行器设计与工程专业的课程教学和科研工作，指导硕士生和博士生等。  研究方向：流体润滑理论、机械设计理论、机械结构强度、轴承-转子系统动力学 | | | | | | | | | |
| 本人近三年的主要工作成就 | | | | | | | | | | | | | |
| 在国内外重要学术刊物上发表论文共 18 篇； 出版专著（译著等） 0 部。 | | | | | | | | | | | | | |
| 获教学科研成果奖共 0 项；其中：国家级 0 项， 省部级 0 项。 | | | | | | | | | | | | | |
| 目前承担教学科研项目共 7 项；其中：国家级项目 3 项，省部级项目 1 项。 | | | | | | | | | | | | | |
| 近三年拥有教学科研经费共 118 万元， 年均 40 万元。 | | | | | | | | | | | | | |
| 近三年给本科生授课（理论教学）共 224 学时；指导本科毕业设计共 7 人次。 | | | | | | | | | | | | | |
| 最具代表性的教学科研成果 | | 序号 | 成果名称 | | | 等级及签发单位、时间 | | | | | | | 本人署名位次 |
| 1 | Mechanical behavior of double-row tapered roller bearing under combined external loads and angular misalignment | | | International Journal of Mechanical Sciences, 2018, 142-143(7): 561-574. | | | | | | | 第一作者 |
| 2 | Interactive effects of rarefaction and surface roughness on aerodynamic lubrication of microbearings | | | Micromachines, 2019, 10(2),155:1-19. | | | | | | | 通讯作者第二作者 |
| 3 | Thermal effects on the tensile forces of rods in rod-fastened rotor of heavy-duty gas turbine | | | Proceedings of the Institution of Mechanical Engineers, Part C-Journal of Mechanical Engineering Science, 2019,233(8): 2753-2762. | | | | | | | 通讯作者  第二作者 |
| 4 | Effect of angular misalignment of inner ring on the contact characteristics and stiffness coefficients of duplex angular contact ball bearings | | | Mechanism and Machine Theory, 2021, 157:104178-1-22 | | | | | | | 通讯作者  第二作者 |
| 5 | 发明专利：一种用于系列可变轴径滑动轴承动态特性测试的实验装置及方法 | | | 国家专利局，2019年4月16日，ZL 2018 1 0550688.9 | | | | | | | 第一发明人 |
| 6 | 发明专利：测定组合转子轮盘连接界面微动摩擦磨损的方法及试验台 | | | 国家专利局，2020年8月18日，ZL 2019 1 0075675.5 | | | | | | | 第一发明人 |
| 目前承担的主要教学科研项目 | | 序号 | 项目名称 | | | 项目来源 | | 起讫时间 | | 经费 | | | 本人承担工作 |
| 1 | 复杂交变载荷作用下船用燃气轮机滑动轴承动力特性研究 | | | 国家工信部 | | 2021-2024 | | 270万 | | | 专题负责人 |
| 2 | 重燃组合转子系统的接触界面损伤特性及动力学研究 | | | 国家自然科学基金委 | | 2019-2022 | | 64万 | | | 负责人 |
| 3 | 基于热-结构耦合分析的盘式拉杆组合转子动力学特性研究 | | | 国家自然科学基金委 | | 2016-2019 | | 63万 | | | 负责人 |
| 4 | 多载荷工况下圆锥滚子轴承的力学性能及转子动力学行为研究 | | | 陕西省科技厅 | | 2019-2021 | | 3万 | | | 负责人 |
| 目前承担的主要教学工作 | | 序号 | 课程名称 | | | 授课对象 | | 人数 | 学时 | 课程性质 | | | 授课时间 |
| 1 | 航空发动机结构与强度 | | | 本科生 | | 100 | 160 | 专业选修课课 | | | 2018-2021 |
| 2 | 工程结构软件分析应用 | | | 本科生 | | 27 | 64 | 专业选修课 | | | 2018.1-6 |
| 3 | 高速转子动力学 | | | 研究生 | | 70 | 240 | 学位选修课 | | | 2018-2021 2018-2021 |
| 4 | 航空结构强度技术 | | | 研究生 | | 70 | 104 | 学位选修课 | | | 2018-2020 2018-2021 |
| 教学管理部门审核意见 | | 情况属实  签章： | | | | | | | | | | | |

专业主要带头人简介（四）

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 姓名 | 杨世强 | | | 性别 | 男 | | 专业技术  职务 | 教授 | | | 第一  学历 | 本科 | |
| 出生  年月 | 1973年 7月 | | 行政职务 | 无 | | | 最后  学历 | 博士 | |
| 第一学历和最后学历毕业时间、学校、专业 | | | | 第一学历：1997年7月毕业于兰州铁道学院机械制造工艺与设备专业  最后学历：2010年11月毕业于西安理工大学机械工程专业 | | | | | | | | | |
| 主要从事工作与研究方向 | | | | 从事机械设计制造及其自动化与工业工程专业教学工作，指导研究生工作，主要研究兴趣涉及智能机器人控制、行为检测与识别、机电系统集成和物流自动化等领域。 | | | | | | | | | |
| 本人近三年的主要工作成就 | | | | | | | | | | | | | |
| 在国内外重要学术刊物上发表论文共 12篇； 出版专著（译著等） 0部。 | | | | | | | | | | | | | |
| 获教学科研成果奖共 0项；其中：国家级 0项， 省部级0项。 | | | | | | | | | | | | | |
| 目前承担教学科研项目共 5项；其中：国家级项目 1项，省部级项目 1项。 | | | | | | | | | | | | | |
| 近三年拥有教学科研经费共 116万元， 年均 35万元。 | | | | | | | | | | | | | |
| 近三年给本科生授课（理论教学）共 300 学时；指导本科毕业设计共 15 人次。 | | | | | | | | | | | | | |
| 最具代表性的教学科研成果 | | 序号 | 成果名称 | | | 等级及签发单位、时间 | | | | | | | 本人署名位次 |
| 1 | MGC-VSLAM：A Meshing-based and Geometric Constraint VSLAM for Dynamic indoor Environments | | | IEEE Access，2020，8（1）：81007-81021. | | | | | | | 1-5 |
| 2 | SGC-VSLAM：A Semantic and Geometric Constraints VSLAM for Dynamic indoor Environments | | | Sensors，2020，20（8），2432：1-20 | | | | | | | 1-5 |
| 3 | 基于无穷Dirichlet过程混合模型的指节偏移测度特征学习 | | | 计算机集成制造系统，2019，25（9）：2305-2313. | | | | | | | 1-5 |
| 4 | 基于磨料磨损的盘形滚刀刀具磨损模型 | | | 中国机械工程，2019，30（15）：1782-1789. | | | | | | | 1-5 |
| 目前承担的主要教学科研项目 | | 序号 | 项目名称 | | | 项目来源 | | 起讫时间 | | 经费：万元 | | | 本人承担工作 |
| 1 | 人机交互合作装配中人体行为分析与理解方法研究 | | | 国家自然基金（面上项目） | | 2015.1-2018.12 | | 83 | | | 1-9 |
| 2 | 基于视频行为识别的社区公共安全风险预警关键技术研究 | | | 陕西省重点研发计划（一般项目） | | 2021.1-2022.12 | | 7 | | | 2-10 |
| 3 | 机械结合面静动态基础特性参数的理论模型与计算方法研究 | | | 国家自然基金（面上项目） | | 2013.1-2016.12 | | 80 | | | 5-10 |
| 目前承担的主要教学工作 | | 序号 | 课程名称 | | | 授课对象 | | 人数 | 学时 | 课程性质 | | | 授课时间 |
| 1 | 机械制造装备设计 | | | 本科 | | 80 | 56 | 专业课 | | | 2017-至今 |
| 2 | 现代物流技术 | | | 本科 | | 45 | 50 | 专业课 | | | 2006-2017 |
| 教学管理部门审核意见 | | 情况属实  签章： | | | | | | | | | | | |

6．教师基本情况表

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **序号** | **姓名** | **性别** | **年龄** | **专业技术职务** | **第一学历毕业学校、专业、学位** | **最后学历毕业学校、专业、学位** | **现从事专业** | **拟任课程** | **专职**  **/**  **兼职** |
| 1 | 贾雄伟 | 男 | 37 | 副教授 | 长春大学、机械工程及其自动化、学士 | 长春理工大学、机械制造及其自动化、硕士 | 机械工程 | 机电一体化原理 | 专职 |
| 2 | 闫树军 | 男 | 40 | 副教授 | 吉林农业大学、机械工程、学士 | 昆明理工大学、机械工程、硕士 | 机械工程 | 机械设计基础 | 专职 |
| 3 | 杨利花 | 女 | 46 | 副教授 | 兰州交通大学、机械工程、学士 | 西安交通大学、机械工程、博士 | 机械工程 | 机电传动控制 | 兼职 |
| 4 | 杨世强 | 男 | 49 | 教授 | 兰州交通大学、机械工程、学士 | 西安理工大学、机械制造、博士 | 机械工程 | 自动控制原理 | 兼职 |
| 5 | 康勇 | 男 | 63 | 教授 | 西南石油学院、油气储运工程、学士 | 罗马尼亚石油天然气大学、机械工程、硕士 | 机械工程 | 模具设计 | 专职 |
| 6 | 曹海兰 | 女 | 33 | 讲师 | 陕西科技大学、机械工程、学士 | 陕西科技大学、机械工程、硕士 | 机械工程 | PLC原理及应用 | 专职 |
| 7 | 雷瑛 | 女 | 39 | 副教授 | 西安工程大学、机械工程、学士 | 西安工程大学、机械工程、硕士 | 机械工程 | 机械工程测试技术 | 专职 |
| 8 | 郭迎辉 | 女 | 37 | 高级工程师 | 西北工业大学、机械工程、学士 | 西北工业大学、机械工程、硕士 | 机械工程 | 微机原理与接口技术 | 专职 |
| 9 | 张媛 | 女 | 32 | 讲师 | 榆林学院、机械工程、学士 | 西安工程大学、机械工程、硕士 | 机械工程 | 液压与气动技术 | 专职 |
| 10 | 赵树萍 | 女 | 30 | 讲师 | 太原科技大学、车辆工程、学士 | 太原科技大学、机械工程、硕士 | 机械工程 | 机电系统设计 | 专职 |
| 11 | 刘晶 | 女 | 32 | 讲师 | 西安科技大学、机械工程、学士 | 兰州交通大学、能源工程、硕士 | 机械工程 | 人机工程 | 专职 |
| 12 | 张凯铭 | 男 | 27 | 讲师 | 西安科技大学、自动化、学士 | 西安科技大学、机械工程、硕士 | 机械工程 | 数控技术及应用 | 专职 |
| 13 | 薛发光 | 男 | 43 | 工程师 | 河南科技大学、机械工程、学士 | 吉林大学、控制工程、学士、硕士 | 控制工程 | 电机与拖动 | 专职 |
| 14 | 闫鸽 | 女 | 27 | 讲师 | 宝鸡文理学院、机械工程、学士 | 兰州理工大学、机械工程、硕士 | 机械工程 | 单片机原理及应用 | 专职 |
| 15 | 赵翔彦 | 男 | 29 | 讲师 | 内蒙古科技大学、车辆工程、学士 | 大连交通大学、车辆工程、硕士 | 车辆工程 | 数字电子技术 | 专职 |

7．主要课程开设情况一览表

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **序号** | **课程名称** | **课程**  **总学时** | **课程**  **周学时** | **授课教师** | **授课学期** |
| 1 | 机械制图 | 64 | 4 | 吴玲 | 1 |
| 2 | 机器人感知技术 | 64 | 4 | 张治国 | 3 |
| 3 | 电子技术 | 64 | 4 | 刘联会 | 3 |
| 4 | 电工基础 | 64 | 4 | 任小文 | 4 |
| 5 | 机械设计基础 | 64 | 4 | 闫树军 | 4 |
| 6 | 机电传动控制 | 48 | 3 | 杨利花 | 4 |
| 7 | EDA与仿真 | 32 | 2 | 聂怡波 | 5 |
| 8 | 控制工程基础 | 48 | 3 | 李克孝 | 5 |
| 9 | 微机原理及应用 | 64 | 4 | 卫军超 | 5 |
| 10 | 液压与气动传动 | 48 | 3 | 蒋莉 | 5 |
| 11 | 电机与拖动 | 48 | 3 | 薛发光 | 6 |
| 12 | 机器人建模与仿真 | 48 | 3 | 高全学 | 6 |
| 13 | 人机工程学 | 48 | 3 | 刘晶 | 6 |
| 14 | 自动化生产线 | 32 | 2 | 贾亚娟 | 6 |
| 15 | 传感器与检测技术 | 48 | 3 | 郭秀才 | 6 |
| 16 | 单片机原理及应用 | 32 | 2 | 王亚亚 | 7 |
| 17 | 电力电子技术 | 48 | 3 | 蔡文皓 | 7 |
| 18 | 图像处理与机器视觉 | 32 | 2 | 王茹玉 | 7 |
| 19 | 智能测控 | 32 | 2 | 郝磊 | 7 |
| 20 | 计算机控制技术 | 32 | 2 | 谢国坤 | 7 |
| 21 | 机电一体化原理 | 48 | 3 | 贾雄伟 | 7 |

8．其他办学条件情况表

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 专业名称 | | 机械电子工程 | | | | | | 开办经费 | 300万元，学校自筹 | | | |
| 申报专业副高及以上职称(在岗)人数 | | | 15 | 其中该专业  专职在岗人数 | | 13 | | 其中校内  兼职人数 | 2 | 其中校外兼职人数 | | 2 |
| 是否具备开办该  专业所必需的图书资料 | | | 是 | 可用于该专业的  教学实验设备  （千元以上） | | | 447  （台/件） | | 总 价 值  （万元） | | 3911.54 | |
| 序  号 | 主要教学设备名称（限10项） | | | | 型 号  规 格 | | | | 台(件) | 购 入 时 间 | | |
| 1 | 遥控机器人系统 | | | | REBOT—V—6R—650—V | | | |  | 2018.05 | | |
| 2 | 组合式拼装机器人 | | | | YMS—0304 | | | | 1 | 2018.04 | | |
| 3 | 3D打印机 | | | | Z3050 | | | | 2 | 2018.05 | | |
| 4 | 单片机综合实验台 | | | |  | | | | 45 | 2018.2 | | |
| 5 | 电机拖动及电气控制系统 | | | |  | | | | 10 | 2018.3 | | |
| 6 | 气动与液动综合控制实训系统 | | | | ZY37704A1 | | | | 1 | 2014.12 | | |
| 7 | 自动化生产线实训系统 | | | | THMSRX-2A | | | | 2 | 2014.04 | | |
| 8 | 机电传动与控制创新组合试验台 | | | | XCJK-III | | | | 2 | 2021.06 | | |
| 9 | 教学用五轴联动数控机床 | | | | XCWZ-II | | | | 2 | 2021.06 | | |
| 10 | 加工中心 | | | |  | | | |  | 2015.04 | | |
| 11 | 数电/模电/电路基础综合试验箱 | | | | CHDZ-TP | | | | 56 | 2019.08 | | |
| 12 | 单片机综合实验箱 | | | | DJ-598KC | | | | 35 | 2019.12 | | |
| 13 | 传感器检测技术实验箱 | | | | YC-998 | | | | 35 | 2019.12 | | |
| 14 | 网络型可编程控制器综合试验台 | | | | SHPLC-S1 | | | | 12 | 2018.12 | | |
| 15 | 电机拖动实验装置 | | | | NMEL-IIA | | | | 10 | 2021.11 | | |
| 16 | 自动控制原理实验箱 | | | | DJ-ATC1 | | | | 53 | 2019.12 | | |
| 17 | ROS智能机器人综合应用开发平台 | | | | 定制 | | | | 6 | 2021.12 | | |
| 18 | ROS工业机械臂教学平台 | | | | 定制 | | | | 10 | 2021.12 | | |

9．学校近三年新增专业情况表

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **学校近三年（不含本年度）增设专业情况** | | | | |
| 序 号 | 专 业 代 码 | 本/专科 | 专 业 名 称 | 设 置 年 度 |
| 1 | 080803T | 本科 | 机器人工程 | 2021 |
| 2 | 081007T | 本科 | 铁道工程 | 2019 |
| 3 | 081809T | 本科 | 轨道交通电气与控制 | 2018 |
| 4 | 120108T | 本科 | 大数据管理与应用 | 2018 |
| 5 | 040106 | 本科 | 学前教育 | 2018 |