

## 课程详述

### COURSE SPECIFICATION

以下课程信息可能根据实际授课需要或在课程检讨之后产生变动。如对课程有任何疑问，请联系授课教师。

The course information as follows may be subject to change, either during the session because of unforeseen circumstances, or following review of the course at the end of the session. Queries about the course should be directed to the course instructor.

1.	<b>课程名称 Course Title</b>	转化医学概论 Introduction to translational medicine
2.	<b>授课院系 Originating Department</b>	医学院 School of Medicine
3.	<b>课程编号 Course Code</b>	MED228
4.	<b>课程学分 Credit Value</b>	3
5.	<b>课程类别 Course Type</b>	专业选修课 Major Elective Courses
6.	<b>授课学期 Semester</b>	春季 Spring
7.	<b>授课语言 Teaching Language</b>	英文 English
8.	<b>授课教师、所属学系、联系方式 Instructor(s), Affiliation &amp; Contact</b> (For team teaching, please list all instructors)	张振锋、医学院/公共卫生及应急管理学院、 <a href="mailto:zhangzf@sustech.edu.cn">zhangzf@sustech.edu.cn</a> Zhenfeng Zhang, School of Medicine / School of Public Health and Emergency Management, <a href="mailto:zhangzf@sustech.edu.cn">zhangzf@sustech.edu.cn</a>
9.	<b>实验员/助教、所属学系、联系方式 Tutor/TA(s), Contact</b>	
10.	<b>选课人数限额(可不填) Maximum Enrolment (Optional)</b>	

11. 授课方式 Delivery Method	讲授 Lectures	习题/辅导/讨论 Tutorials	实验/实习 Lab/Practical	其它(请具体注明) Other (Please specify)	总学时 Total
	38	10			48
学时数 Credit Hours					
12. 先修课程、其它学习要求 Pre-requisites or Other Academic Requirements	无 None				
13. 后续课程、其它学习规划 Courses for which this course is a pre-requisite	无 None				
14. 其它要求修读本课程的学系 Cross-listing Dept.	无 None				

### 教学大纲及教学日历 SYLLABUS

#### 15. 教学目标 Course Objectives

转化医学概论课程教学目标是帮助学生理解：（1）转化医学的基本概念和发展历程；（2）转化生物医学研究的基本特征、策略、和方法；（3）从科研到临床所涉及的主要阶段及其核心工作内容；（4）转化医学所涉及主要机构及其基本职能角色和运作机制。

The objectives of the course "Introduction to translational medicine" include: (1) to help the student to understand the definition, frame, and development of translational medicine; (2) to introduce the basic principles of translational medicine research including strategies, tools, and methods; (3) to explain the main stages and key work from academia research to clinical practice; (4) to help the student to understand the role and the principles of main institutes and organizations in translational medicine.

#### 16. 预达学习成果 Learning Outcomes

通过转化医学概论的学习，预期学生能够：（1）了解转化医学的大致全貌和其中的主要概念；（2）对从科学研究到医学临床应用的整个过程所涉及的主要环节和核心内容有较为系统的了解；（3）对转化医学具体案例的核心要素进行初步分析；（4）对科研机构、政府药物管理部门、医院、以及生物医药企业等机构有更加深入的了解；（5）形成对转化医学的兴趣，更深入地研究和探讨转化医学的具体领域。

At the end of the course "Introduction to translational medicine", the students will be able to: (1) describe the big picture and main definitions of translational medicine; (2) have a systematic understanding of the whole process of translational medicine from academia research to clinical practice including the different stages and the ; (3) analyze the key points of translational research cases; (4) gain a deeper understanding of the research institutes, governmental drug administration agencies, hospitals, and biomedical companies; (5) Develop learning interests in the field of translational medicine and explore more topics related to translational medicine.

#### 17. 课程内容及教学日历（如授课语言以英文为主，则课程内容介绍可以用英文；如团队教学或模块教学，教学日历须注明主讲人）

**Course Contents (in Parts/Chapters/Sections/Weeks. Please notify name of instructor for course section(s), if this is a team teaching or module course.)**

教学内容主要包含：（1）转化医学的基本概念和国内外发展现状；（2）转化医学研究的核心内容，基本策略、工具、和方法；（3）从科研到临床所涉及的主要阶段及其核心工作内容；（4）转化医学所涉及主要机构及其基本职能和运作机制；（5）转化医学案例分析包括诊断、医疗器械、和药物。

The main contents of the course include: (1) the definition of translational medicine and its development in China and

abroad; (2) basic principles, tools, and methods in translational medicine research; (3) the main stages and modules from academic research to clinical practice; (4) role and principles of main institutes and organizations in translational medicine; (5) translational medicine case study including diagnosis, medical equipment, and drugs.

Section	Topic	Hours
1	<p>课程介绍, 转化医学的概念、发展历程、和主要框架</p> <ul style="list-style-type: none"> <li>• 课程结构和考核等介绍</li> <li>• 转化医学的定义</li> <li>• 转化医学发展的历史简介</li> <li>• 转化医学包含的主要部分</li> </ul> <p>Course introduction; Definition, development, and key parts of translational medicine</p> <ul style="list-style-type: none"> <li>• Introduction of the course organization and assessment</li> <li>• The definition of translation medicine</li> <li>• A brief history of translational medicine</li> <li>• Key pillars of modern translational medicine</li> </ul>	3
2	<p>转化医学的发展现状及存在的主要挑战</p> <ul style="list-style-type: none"> <li>• 多学科交叉知识</li> <li>• 转化医学涉及的核心技能</li> <li>• 我国转化医学发展现状</li> <li>• 国外转化医学发展现状</li> </ul> <p>The main challenges in translational medicine and the state of the art</p> <ul style="list-style-type: none"> <li>• Interdisciplinary knowledge</li> <li>• Core skills in translational medicine</li> <li>• The state of the art of translational medicine in China</li> <li>• The state of the art of translational medicine in other countries</li> </ul>	3
3	<p>转化医学的基本策略、工具、和方法</p> <ul style="list-style-type: none"> <li>• 基础研究是转化医学的根基</li> <li>• 转化医学研究的传统策略</li> <li>• 转化医学研究的新型策略</li> <li>• 转化医学研究的主要工具和方法</li> </ul> <p>The basic strategies, tools, and methods in translational medicine research</p> <ul style="list-style-type: none"> <li>• Basic research as the foundation of translational medicine</li> <li>• The traditional strategies for translational medicine research</li> <li>• The emerging strategies for translational medicine research</li> <li>• The main tools and methods in translational medicine research</li> </ul>	3
4	<p>试验模型的价值和转化潜能</p> <ul style="list-style-type: none"> <li>• 无细胞模型</li> <li>• 细胞培养模型</li> <li>• 动物模型</li> <li>• 转化医学研究模型的进展</li> </ul> <p>Experimental models: value and translation potency</p> <ul style="list-style-type: none"> <li>• Cell-free models</li> <li>• Cell culture models</li> <li>• Animal models</li> <li>• Recent advances in models for translational medicine research</li> </ul>	3
5	<p>靶点的发现和验证</p> <ul style="list-style-type: none"> <li>• 由假设推动的靶点发现</li> <li>• 靶点筛选</li> <li>• 早期转化的评估要素</li> <li>• 老药新用</li> </ul>	3

	<p>Target identification and validation</p> <ul style="list-style-type: none"> <li>• Hypothesis-driven target identification</li> <li>• Target profiling</li> <li>• Essential dimensions of early translational assessment</li> <li>• Using old drugs for new purposes</li> </ul>	
6	<p>生物标志物的转化医学成败的关键</p> <ul style="list-style-type: none"> <li>• 生物标志物对诊断和药物开发的重要意义</li> <li>• 生物标志物的分类</li> <li>• 转化医学中生物标志物的选择标准</li> <li>• 从监管部门的角度来看待生物标志物</li> </ul> <p>Biomarkers as key elements of successful translation</p> <ul style="list-style-type: none"> <li>• Important roles of biomarkers for diagnosis and drug development</li> <li>• Biomarker classes</li> <li>• Criteria for defining biomarkers for translational medicine</li> <li>• Biomarkers in the context of health authorities and consortia</li> </ul>	3
7	<p>诊断试剂、医疗器械、和药物研发各自的特殊考虑因素</p> <ul style="list-style-type: none"> <li>• 诊断试剂研发各自的特殊考虑因素</li> <li>• 医疗器械研发各自的特殊考虑因素</li> <li>• 药物研发各自的特殊考虑因素</li> </ul> <p>Special considerations for the development of diagnosis, equipment, and drugs</p> <ul style="list-style-type: none"> <li>• Special considerations for the development of diagnosis</li> <li>• Special considerations for the development of equipment</li> <li>• Special considerations for the development of drugs</li> </ul>	3
8	<p>获得知识产权保护是个重要的里程碑</p> <ul style="list-style-type: none"> <li>• 哪些成果能够被知识产权保护?</li> <li>• 知识产权的类型</li> <li>• 何时和如何申请知识产权</li> <li>• 转化医学中知识产权相关的其他问题</li> </ul> <p>Intellectual property, an important milestone</p> <ul style="list-style-type: none"> <li>• What discoveries can be protected?</li> <li>• Different classes of intellectual properties</li> <li>• When and how to apply an intellectual property</li> <li>• Other intellectual property issues in translational medicine</li> </ul>	3
9	<p>早期临床试验设计</p> <ul style="list-style-type: none"> <li>• 临床试验的不同阶段</li> <li>• 设计临床试验的基本原则</li> <li>• 临床试验结果的评估</li> <li>• 诊断试剂和医疗器械的特殊考虑因素</li> </ul> <p>Early clinical trial design</p> <ul style="list-style-type: none"> <li>• Different phases of clinical trials</li> <li>• Principles of designing clinical trials</li> <li>• Evaluation and decision-making</li> <li>• Special considerations for diagnosis and equipments</li> </ul>	3
10	<p>大数据和人工智能时代的转化医学</p> <ul style="list-style-type: none"> <li>• 遗传学、组学、和人工智能的进展介绍</li> <li>• 组学在靶点发现和验证中的作用</li> <li>• 遗传学和组学对个体化医学的意义</li> <li>• 人工智能对转化医学的影响</li> </ul> <p>Translational medicine in the era of big data and artificial intelligence</p> <ul style="list-style-type: none"> <li>• Recent advances of genetics, "omics", and artificial intelligence</li> <li>• The power of "omics" for target identification and validation</li> <li>• Genetics and "omics" for personalized medicine</li> </ul>	3

	<ul style="list-style-type: none"> <li>How does artificial intelligence affect translational research</li> </ul>	
11	<p>科研机构和生物医药公司在转化医学中的智能和运作方式</p> <ul style="list-style-type: none"> <li>科研机构在转化医学中的智能和运作方式</li> <li>生物医药公司在转化医学中的智能和运作方式</li> <li>科研机构和生物医药公司中的人力资源和职业发展</li> </ul> <p>The role and principles of research institutes and biomedical companies in translational medicine</p> <ul style="list-style-type: none"> <li>The role and principles of research institutes in translational medicine</li> <li>The role and principles of biomedical companies in translational medicine</li> <li>Personalle and career development</li> </ul>	3
12	<p>医院和政府管理机构在转化医学中的智能和运作方式</p> <ul style="list-style-type: none"> <li>医院在转化医学中的智能和运作方式</li> <li>政府管理机构在转化医学中的智能和运作方式</li> <li>医院和政府管理机构中的人力资源和职业发展</li> </ul> <p>The roles and principles of hospitals and govermental administration agencies in translational medicine</p> <ul style="list-style-type: none"> <li>The role and principles of hospitals in translational medicine</li> <li>The role and principles of govermental administration agencies in translational medicine</li> <li>Personalle and career development</li> </ul>	3
13	<p>分组协作和案例分析 I: 诊断产品</p> <ul style="list-style-type: none"> <li>学生分组和案例分配</li> <li>相互协作进行案例分析 (课外完成)</li> <li>课堂案例分析总结演讲</li> </ul> <p>Team work and case study 1: diagnosis</p> <ul style="list-style-type: none"> <li>Grouping and assignment of cases</li> <li>Team work for analysis of the cases (home work)</li> <li>Presentation of the analysis in the class</li> </ul>	3
14	<p>分组协作和案例分析 II: 医疗器械</p> <ul style="list-style-type: none"> <li>学生分组和案例分配</li> <li>相互协作进行案例分析 (课外完成)</li> <li>课堂案例分析总结演讲</li> </ul> <p>Team work and case study 2: equipment</p> <ul style="list-style-type: none"> <li>Grouping and assignment of cases</li> <li>Team work for analysis of the cases (home work)</li> <li>Presentation of the analysis in the class</li> </ul>	3
15	<p>分组协作和案例分析 II: 药物</p> <ul style="list-style-type: none"> <li>学生分组和案例分配</li> <li>相互协作进行案例分析 (课外完成)</li> <li>课堂案例分析总结演讲</li> </ul> <p>Team work and case study 3: drugs</p> <ul style="list-style-type: none"> <li>Grouping and assignment of cases</li> <li>Team work for analysis of the cases (home work)</li> <li>Presentation of the analysis in the class</li> </ul>	3
16	<p>回顾、总结、和展望</p> <ul style="list-style-type: none"> <li>回顾和总结课程的主要内容</li> <li>转化医学的未来展望</li> <li>引导学生开展进一步的学习</li> </ul> <p>Overview, summary, and perspectives</p> <ul style="list-style-type: none"> <li>Overview and summarize main content of the course</li> <li>Perspectives regarding translational medicine</li> </ul>	3

	<ul style="list-style-type: none"> <li>• Guide students for future study</li> </ul>	
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18. 教材及其它参考资料 **Textbook and Supplementary Readings**

1. Principles of Translational Science in Medicine: From Bench to Bedside 3rd Edition. By Martin Wehling. 2022.
2. Translational Medicine: Molecular Pharmacology and Drug Discovery (Current Topics from the Encyclopedia of Molecular Cell Biology and Molecular Medicine) 1st Edition. By Robert A. Meyers. 2022.

课程评估 **ASSESSMENT**

19. 评估形式 Type of Assessment	评估时间 Time	占考试总成绩百分比 % of final score	违纪处罚 Penalty	备注 Notes
出勤 Attendance	平时	15	缺席一次扣 1%	
课堂表现 Class Performance	平时	15		
小测验 Quiz				
课程项目 Projects	第 13, 14, 15 周	30		13, 14, 15 周案例分析各占 10%
平时作业 Assignments				
期中考试 Mid-Term Test				
期末考试 Final Exam	统一安排	40		
期末报告 Final Presentation				
其它 (可根据需要 改写以上评估方式) Others (The above may be modified as necessary)				

20. 记分方式 **GRADING SYSTEM**

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| <input checked="" type="checkbox"/> A. 十三级等级制 <b>Letter Grading</b><br><input type="checkbox"/> B. 二级记分制 (通过/不通过) <b>Pass/Fail Grading</b> |
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课程审批 **REVIEW AND APPROVAL**

21. 本课程设置已经过以下责任人/委员会审议通过  
This course has been approved by the following person or committee of authority

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