2017厦门大学数学拔尖学生联合暑期学校

1. **简介**

我校数学拔尖计划联合暑期学校坚持数学高层次基础知识的教学与最前沿数学动态了解相互结合的办学宗旨；2坚持专家讲授和助教辅导相结合的教学模式。2017年将分别在代数、拓扑、方程和计算四大领域安排4个短课程。每个课程上6次课，每次3课时，另加1次考核。每门课程计1学分。成绩合格，将由学校教务处发正式证书。另、邀请国内外著名专家，参照学院“景润数学”讲座标准，穿插安排讲座4场左右。

1. **时间**

7月2日（星期天）报到，报到地点待定。暑期学校从7月3日开始上课，7月28日截止。

1. **招生对象**

1.本院二、三年级“拔尖班”学生和若干优秀非拔尖班学生（成绩排名前50%）共30名。

2.依托数学学科“拔尖计划”十校联盟，招收其它9个学校的二、三年级数学“拔尖计划”学生或优秀非拔尖班学生（成绩排名前50%）30名。

1. **学员待遇**
2. 舒适的上课和自习环境；
3. 餐补400元；
4. 提供学生宿舍和生活用品（限外校学员）；
5. 联谊活动。
6. **主讲教师及课程信息**
7. 杜 杰，新南威尔士大学教授和厦门大学讲座教授。

名称：Geometries and Transformation Groups

简介：Mathematics went through quite a revolution around the turn of the 20th century. In particular, an axiomatic approach infiltrated the mathematical paradigm, both as a tool to ensure mathematical rigour and to abstract common principles working in a variety of different settings.

First year mathematics emphasizes computation over abstraction and rigour. Later year courses (and Pure Mathematics in general) reverse this, so students need to learn some new skills and some new ways of thinking about mathematical objects.

This course is designed to help you develop the ability to write rigorous mathematical proofs in a setting where the level of abstraction is still quite modest. As such it will serve as an excellent preparation for the higher year Pure Mathematics courses.

We will study various geometries via the groups of allowable transformations. Starting with the Euclidean Geometry, the allowable transformations in this geometry are those preserving distance. We will have a close look at the classifications of plane isometries and the symmetry groups in 𝑹𝑹2 and 𝑹𝑹3. Then we move on to look at the Similarity Geometry, the Affine Geometry and the Projective Geometry via the transformations that preserve, respectively, angles, parallelism or send lines to lines. We will investigate the relationship between the groups of these transformations and give some applications to the classical triangle geometry.

1. 邱瑞锋，华东师范大学教授、杰青。

课程详情待定。

1. 李 竞，中国科学院研究员、杰青、厦门大学讲座教授。

名称：1维可压缩Navier-Stokes方程的若干数学问题

简介：Navier Stokes（纳维叶－斯托克斯）[方程](http://baike.baidu.com/item/%E6%96%B9%E7%A8%8B)是流体力学中描述粘性[牛顿流体](http://baike.baidu.com/item/%E7%89%9B%E9%A1%BF%E6%B5%81%E4%BD%93)的方程，是目前为止尚未被完全解决的方程，目前只有大约一百多个特解被解出来，是最复杂的[方程](http://baike.baidu.com/item/%E6%96%B9%E7%A8%8B)之一。本课程将介绍1维可压缩Navier-Stokes方程（等熵和非等熵）古典解的整体存在性与大时间行为。课程大部分内容只需学生具备微积分基础即可学习。

1. 汤华中，北京大学教授、杰青。

名称：Numerical Methods for Hyperbolic Conservation Laws

简介：

（1）摘要：The mathematical tools introduced in other four mini-courses are essential in developing, analyzing,and successfully using numerical methods for hyperbolic conservation laws, particularlyfor problems involving shock waves.

This 18-20 hour mini-course is devoted to some fundamental aspects and recent developmentson numerical methods for hyperbolic conservation laws. The content will cover finite differenceschemes for linear hyperbolic equations, conservative finite difference schemes, modernshock-capturing schemes, and discontinuous Galerkin finite element methods for quasilinearhyperbolic conservation laws. It will also discuss the discrete entropy conditions, nonlinearstability, and convergence for conservative numerical methods and some other topics relatedto recent developments on numerical methods for hyperbolic conservation laws. Unfortunately,the breadth and depth of coverage will be limited by the length of the course, and some parts

are rather sketchy.

（2）目录

1 Finite difference schemes for linear hyperbolic equations.

2 Conservative finite difference schemes in one dimension.

2.1 Definition and properties of conservative finite difference schemes.

2.2 Monotone schemes and discrete entropy conditions.

2.3 Stability and convergence of monotone schemes.

2.4 Total variation diminishing (TVD) schemes.

2.5 Essentially non-oscillatory (ENO) schemes and weighted ENO schemes.

2.6 Extension for systems of conservation laws.

3 Conservative finite difference schemes in multi-dimension.

4 Discontinuous Galerkin methods for hyperbolic conservation laws.

5 Some advanced topics.

（3）参考文献

[1] B. Cockburn and C.-W. Shu, Runge-Kutta discontinuous Galerkin methods for convectiondominatedproblems, J. Sci. Comput., 16(2001), 173-261.

[2] D. Kroner, Numerical Schemes for Conservation Laws, Wiley, John & Sons, 1997.

[3] R.J. LeVeque, Numerical Methods for Conservation Laws, 2nd ed., Birkhauser, 1992.

[4] C.-W. Shu, High order weighted essentially nonoscillatory schemes for convection dominatedproblems, SIAM Rev., 51 (2009), 82-126.

[5] E.F. Toro, Riemann Solvers and Numerical Methods for Fluid Dynamics, A PracticalIntroduction, 3rd ed., Springer, 2009.

**六、报名方式**

外校学员以学校为单位填写下面表格邮件发至xajin@xmu.edu.cn，非拔尖班学生请提供成绩排名证明。

报名截止日期：6月15日。限额30名，先报名者优先录取，录满为止。

联系人：金贤安教授

电话：186 0692 2584

电邮：xajin@xmu.edu.cn

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\*备注栏填是否拔尖班学生。

**七、注意事项**

学员在暑期学校学习期间必须遵守有关规章制度和暑期学校的规定。学员在学习期间如发生医疗费用及个人行为导致的意外事故，由学员本人及其派出单位承担责任。