

California State University Long Beach

Math 555: Knot Theory, Spring 2019

Professor : Ryan Blair
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Office : FO3-213
Office Hours: TBD

Class Meetings: TuTh 5:30-6:45 pm in LA5-169

Text: Although the course has no official text, I will be pulling from the following resources

The Knot Book, by Colin Adams
Introduction to Knot Theory, by Richard Crowell and Ralph Fox
Knots and Links, by Dale Rolfsen
Knots Knotes, by Justin Roberts. Found here: <http://math.ucsd.edu/~justin/Papers/knotes.pdf>

Course web page: <http://www.csulb.edu/~rblair/Math555S19/index.html>

Prerequisites: MATH 550A or MATH 550. This course is not eligible for credit for students who took MATH 590 in fall 2016.

Graduate geometry requirement: This course satisfies the graduate geometry requirement.

Course description: This course is a graduate introduction to knot theory. We will cover the following topics together with additional topics as time permits: the definition of a knot, knot equivalence, knot diagrams, Reidemeister moves, colorings of knots, combinatorial invariants of knots, free groups, group presentations, the fundamental group, the knot group, the Alexander polynomial, the Jones polynomial, the Tait conjectures, the meridional rank conjecture, and Wirtinger number.

Learning Outcomes: After finishing this course, students will be able to define all fundamental knot-theoretic concepts (knot, ambient isotopy, Reidemeister moves, connected sum, bridge number, crossing number, Seifert surface, width, Jones polynomial, Alexander polynomial, knot group, etc.). Students will be able to apply proof techniques from multiple disciplines (topology, abstract algebra and analysis) to derive fundamental theorems about knots, to produce examples of knots with certain properties, and to produce counterexamples to knot-theoretic statements. Students will gain skills in writing mathematical proof in a highly interdisciplinary and current field. Finally, students will learn to preform, write about, and present mathematical research in the controlled environment of an extensive final project.

Attendance: To be successful in this course, you should be present for all class meetings. If you must miss class, please notify me as soon as possible. For more information, see http://www.csulb.edu/divisions/aa/catalog/current/academic_information/class_attendance.html

Homework: Homework assignments will be distributed in class and/or on the course web page, typically once a week. They will be due as noted. You are responsible for being aware of the assignments and due dates. Homework assignments will incorporate exercises from our course texts and exercises from outside sources. Homework will be graded based on correctness and completeness. Late homework will be accepted up to one week after the due date, but will be penalized with a 25% deduction from the final score.

You are strongly encouraged to work in groups to exchange ideas and help each other understand how to approach problems, but the work you turn in must be your own! If you work with others on an assignment, be sure to indicate the names of the other students on your homework. Additionally, if you use any outside resources (i.e. internet sources, other mathematicians, other books) to help you solve homework problems, you must cite your sources. **Failure to follow these rules will result in a score of zero on an assignment and may constitute a violation of academic integrity.**

Homework must be legible, well-organized, and written in complete sentences. Handwritten work is fine, but you are encouraged to type up the problems in LaTeX.

Exams: There will be one midterm exam, according to the following tentative schedule:

1) Midterm 1: in class, March 8th

Final Project: The final project will give you the opportunity to explore a topic in knot theory at a deep level. The project will have a written and oral presentation component. Additional information regarding the final project will be distributed later in the course.

Grades: Your grade for the course will be determined based on the following factors:

Homework 50 %

Midterm exam 20 %

Final Project 30 %

Office hours: I will hold regular office hours at the times noted above, unless I email or tell you otherwise in class. Alternatively, you may set up an appointment to meet with me.

Accommodations: Students with disabilities should immediately contact Disabled Student Services (Brotman Hall 270) or call 562-985-5401 to review and address their academic accommodation requests. Students will need to present the appropriate forms issued by DSS to the instructor. Information regarding DSS can be found at <http://www.csulb.edu/divisions/students2/dss/>.

Withdraw: The last day to withdraw without receiving a W is **February 4th**. The last day to withdraw with a W is **April 19th**. Plan early since it's sometimes hard to track people down for signatures. Any office hour may be cancelled due to illness or necessary appointments, and the students should not therefore depend on a faculty member being in his/her office for a particular office hour. Students should secure any necessary signatures well in advance of any deadlines.

Academic Integrity: Academic integrity is expected for assignments and exams. The usual penalty for a student caught cheating or plagiarizing includes an F in the course. Further penalties may include probation, suspension, or expulsion from the university. More information can be found on http://www.csulb.edu/divisions/aa/catalog/current/academic_information/cheating_plagiarism.html

Zero-Tolerance Policy: CNSM is committed to providing a safe and positive learning environment and has established a zero-tolerance policy for any sexual/gender-based misconduct, including, but not limited to sexual harassment, assault, relationship violence or stalking for all faculty, staff, and students.

The following entities at CSULB have been established to provide support and assistance for victims of sexual harassment and assault: Title IX Office http://web.csulb.edu/divisions/students/titleix/titleix_reporting.html, CSULB University Police Department <https://www.csulb.edu/university-police/title-ix>, The Women's & Gender Equity Center, http://web.csulb.edu/divisions/students/wrc/sexual_assault/, and the Counseling & Psychological Services

(CAPS) Office <http://web.csulb.edu/divisions/students/caps/>, and Student Health Services: http://web.csulb.edu/divisions/students/shs/sexual_assault.htm. For more information regarding CSULB's policies on sexual misconduct and discrimination: <http://www.csulb.edu/titleix>.

As members of The Beach community, we practice tolerance and denounce hate and prejudice. Our classroom will strive to be a place of mutual respect where the focus is on learning and student success.

Note: The instructor reserves the right to alter anything on this syllabus at any time during the semester. Any alterations will be announced in class.