

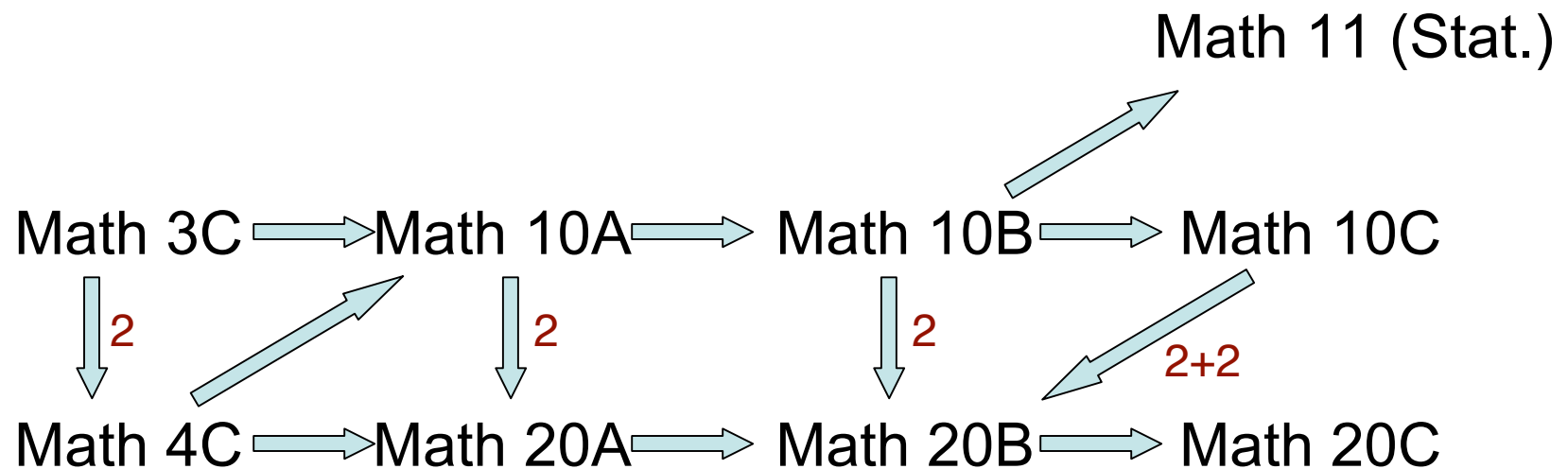
San Diego Area
Inter-Segmental
Mathematics Articulation
Conference

*University of California, San Diego
Saturday, April 16*

Topics - Outline

- Lower division course offerings.
- Lower division course content.
- Technology: Calculators, Matlab.
- Summer session courses.
- 20E.
- Proof-based courses.
- Placement.
- Articulation.
- Transfer credit.
- Advising issues.

First Year Mathematics Courses



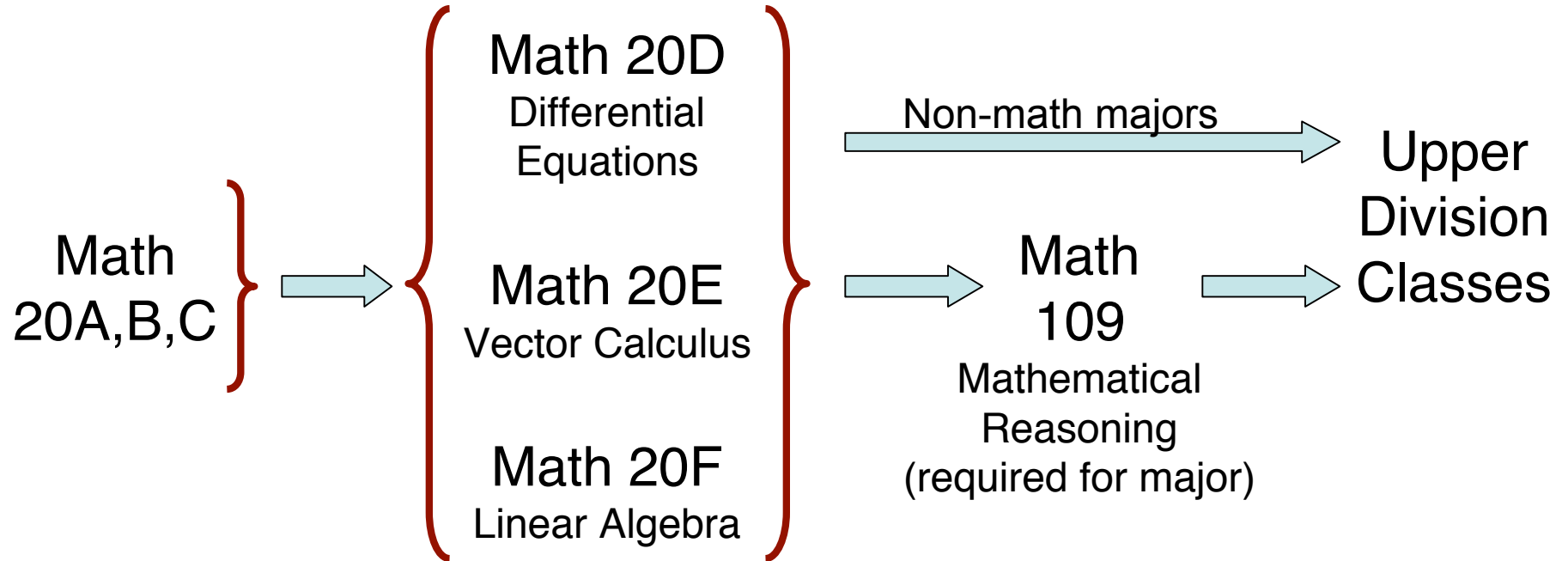
Precalculus: 3C and 4C.

Discrete Math: Math 15A / CSE 20.

Calculus 10A-C: for less technical majors.

Calculus 20A-F. For science and engineering majors.

Second Year Mathematics Courses



Math 20D, E, F may be taken in any order.

Math 109 may be taken concurrently with Math 100A, 103A, 140A, 142A.

Math 100ABC, 103AB – Abstract algebra.

Math 140ABC, 142AB – Real analysis.

Class offerings by Quarter

Numbers of classes offered, 2005-2006:

<u>Class</u>	<u>Fall</u>	<u>Winter</u>	<u>Spring</u>	<u>Totals</u>
3C	3	1		4
4C	1	1		2
10A	4	2	1	7
10B	2	4	2	8
10C	2	2	4	8
11			1	1
15A	?	?	?	
18		1		1
20A	4	1	1	6
20B	5	5	2	12
20C	4	4	4	12
20D	3	3	3	9
20E	2	2	3	7
20F	3	3	3	9
109	2	2	3	7

Summer Course Offerings

Courses offered, Summer 2005:

	Lower Division	Upper Division
Summer Session 1	10A, 20A, 20C, 20D, 20E, 20F	104A, 110
Summer Session 2	3C, 10B, 10C, 20B, 20F	109, 120A, 168A

Course Content

Precalculus Courses

- **Math 3C:** Functions and their graphs. Linear and polynomial functions, zeroes, inverse functions, exponential and logarithm, trigonometric functions and their inverses. Emphasis on understanding algebraic, numerical and graphical approaches making use of graphing calculators. (No credit given if taken after Math. 4C, 10A, or 20A.)
Prerequisites: two or more years of high school mathematics or equivalent.
- **Math 4C:** Review of polynomials. Graphing functions and relations: graphing rational functions, effects of linear changes of coordinates. Circular functions and right triangle trigonometry. Reinforcement of function concept: exponential, logarithmic, and trigonometric functions. Vectors. Conic sections. Polar coordinates. (No credit given if taken after Math. 10A or 20A. Two units of credit given if taken after Math. 3C.)
Prerequisites: Math Placement Exam qualifying score, or Math. 3C with a grade of C or better.

Math 10ABC Calculus

- **Math 10A:** Differentiation and integration of algebraic functions. Fundamental theorem of calculus. Applications. (No credit given if taken after Math. 20A.) *Prerequisites: Math Placement Exam qualifying score, or AP Calculus AB score of 2, or SAT II Math. 2C score of 650 or higher, or Math. 3C with a grade of C or better, or Math. 4C with a grade of C- or better.*
- **Math 10B:** Further applications of the definite integral. Calculus of trigonometric, logarithmic, and exponential functions. Complex numbers. (No credit given if taken after Math. 20B.) *Prerequisites: AP Calculus AB score of 3, 4, or 5, or Math. 10A with a grade of C- or better, or Math. 20A with a grade of C- or better.*
- **Math 10C:** Vector geometry, velocity, and acceleration vectors. (No credit given if taken after Math. 20C.) *Prerequisites: AP Calculus BC score of 3, 4, or 5, or Math. 10B with a grade of C- or better, or Math. 20B with a grade of C- or better.*

Statistics Courses

- **Math 11:** Events and probabilities, combinatorics, conditional probability, Bayes formula. Discrete random variables: mean, variance; binomial, multinomial, Poisson distributions. Continuous random variables: densities, mean, variance; normal, uniform, exponential distributions. Sample statistics, confidence intervals, regression. Applications.
Intended for biology and social science majors.
Prerequisites: Math 10A-B or Math 20A-B.

Upper Division:

- **Math 183.** Statistical Methods. (Probability and Statistics)
- **Math 186.** Probability and Statistics for Bioinformatics.
- **Math 180AB(C).** Probability.
- **Math 181AB(CE).** Statistics.

Calculus 20ABC

- **Math 20A:** Foundations of differential and integral calculus of one variable. Functions, graphs, continuity, limits, derivative, tangent line. Applications with algebraic, exponential, logarithmic, and trigonometric functions. Introduction to the integral. (Two credits given if taken after Math. 10A and no credit given if taken after Math. 10B or Math. 10C.)
Prerequisites: Math Placement Exam qualifying score, or AP Calculus AB score of 2 or 3, or SAT II Math. 2C score of 650 or higher, or Math. 4C with a grade of B or better, or Math. 10A with a grade of C- or better.
- **Math 20B:** Integral calculus of one variable and its applications, with exponential, logarithmic, hyperbolic, and trigonometric functions. Methods of integration. Polar coordinates in the plane. (Two units of credits given if taken after Math. 10B or Math. 10C.)
Prerequisites: AP Calculus AB score of 3, 4, or 5, or AP Calculus BC score of 3, or Math. 20A with a grade of C- or better, or Math. 10B with a grade of C- or better, or Math. 10C with a grade of C- or better.
- **Math 20C:** Vector geometry, vector functions and their derivatives. Partial differentiation. Maxima and minima. Double integration, (Two units of credit given if taken after Math. 10C.)
Prerequisites: AP Calculus BC score of 3, 4, or 5, or Math. 20B with a grade of C- or better.

Second-year Calculus

- **Math 20D: Differential equations.** Infinite series. Ordinary differential equations: exact, separable, and linear; constant coefficients, undetermined coefficients, variations of parameters. Series solutions. Systems, Laplace transforms, technique for engineering sciences.
Computing symbolic and graphical solutions using Matlab.
Prerequisites: Math 20C or equivalent.
- **Math 20E: Vector calculus.** Change of variable in multiple integrals, Jacobian Line integrals, Green's theorem. Vector fields, gradient fields, divergence, curl. Spherical and cylindrical coordinates. Taylor series in several variables. Surface integrals, Stoke's theorem. Gauss' theorem and its applications. Conservative fields.
Prerequisites: Math 20C or equivalent.
- **Math 20F: Linear algebra.** Matrix algebra, solution of systems of linear equations by Gaussian elimination, determinants. Linear and affine subspaces, bases of Euclidean spaces. Eigenvalues and eigenvectors, quadratic forms, orthogonal matrices, diagonalization of symmetric matrices. Applications.
Computing symbolic and graphical solutions using Matlab.
Prerequisites: Math 20C or equivalent.

Introductory proof courses

- **Math 15A / CSE 20. Discrete mathematics.** Basic discrete mathematical structures: sets, relations, functions, sequences, equivalence relations, partial orders, number systems. Methods of reasoning and proofs: propositional logic, predicate logic, induction, recursion, pigeonhole principle. Infinite sets and diagonalization. Basic counting techniques; permutations and combinations. Applications will be given to digital logic design, elementary number theory, design of programs, and proofs of program correctness.

Prerequisites: CSE 8A or CSE 8B or CSE 11. (Programming in C++/Java). CSE 8B or CSE 11 may be taken concurrently with Math. 15A/CSE 20.

- **Math 109. Mathematical Reasoning.** This course uses a variety of topics in mathematics to introduce the students to rigorous mathematical proof, emphasizing quantifiers, induction, negation, proof by contradiction, naive set theory, equivalence relations and epsilon-delta proofs.

Required of all departmental majors.

Prerequisites: Math. 20F.

Upper-division core proof courses

- **Math 100AB(C). Modern algebra.** Abstract algebra.
- **Math 103AB. Modern applied algebra.** Applied abstract algebra.
- **Math 140AB(C).** Real analysis.
- **Math 142AB.** Advanced calculus.

These classes require Math 109 as a corequisite.

Math 103AB and Math 142AB are less rigorous versions of 100AB and 140AB.

Math 100ABC, Math 140ABC are recommended for all students thinking of graduate studies in mathematics.

Technology

Calculators

- **Math 10A-C, 11.** TI-83 encouraged.
- **Math 20A-F.** TI-86 recommended.
Calculators with symbolic capabilities often disallowed.
Sometimes no calculators allowed on exams.

Matlab

- **Math 20D (Diff. Eq.) and Math 20F (Lin. Alg.) include Matlab exercises.**

These exercises are rewritten annually, and are timed to follow lecture topics. However, Matlab is not used during regular lectures. Instead, students have an extra weekly section meeting for Matlab work.

Students often appreciate the Matlab assignments since they will need to use Matlab in later courses for their major.

Articulation and Prerequisites

Enforcement of prerequisites

Recently, UCSD Mathematics has begun enforcing prerequisites.

For transfer students, this means that they may not enroll in a course unless they will have taken, and passed, the appropriate prerequisite courses or their equivalent.

It is expected that most departments will enforce prerequisites in the near future, once the Registrar develops the software systems to support this.

Current Articulation with UCSD Math

College	10A	10B	10C	20A	20B	20C	20D	20F	Date
Cuyamaca	178 or 180	280	281	180	280	281	285 & 280	284	Oct 98
Grossmont	178	280	281	180	280	281	285 & 280	284	Oct 98
Imperial Valley	124			192	194	210	220 & 194	230	Sep 03
Mesa	121	122	122	150	151	252	255 & 251	254	Oct 98
MiraCosta	150	155	260	150	155	260	265 & 155	270	Oct 98
Miramar	121	122	122	150	151	252	255 & 151	254	Oct 98
Palomar	140	141	205	140	141	205	206 & 141	200	Dec 02
City College	121	122	122	150	151	252	255 & 151	254	Oct 98
Southwestern	121	122	122	250	251	252	253 & 251	254	Oct 98
SDSU	120	121	122	150	151	252		254	Aug 94
Cal St San Marcos									