MATH 150A MATH ANALYSIS I FALL 2003

Lecture MWF 2:00pm - 3:30pm JR221

Instructor: Alexander Alekseenko, FOB130 ,

phone: (818) 677-2645

e-mail: alexander.alekseenko@scun.umn.edu

web: www.csun.umn.edu/math/

Textbook. D. Varberg, E.J. Purcell, and S.E. Rigdon*Calculus*, 8th Edition, Prentice Hall, Upper Saddle River, New Jersey 07458, 2000.

Course content. Functions; limits and continuity; differentiation: definition, basic rules, chain rule, derivatives for power and trigonometric functions; higher order derivatives; implicit differentiation; related rates problems; linear approximation and differentials; max-min, 2nd derivative test; curve sketching; the mean value theorem; integration: antidifferentiation, area; the definite integral; fundamental theorem of calculus, mean value theorem for integrals; logarithmic and exponential functions; inverse trigonometric functions and their derivatives. 5 credits, 3 classes per week, 3 midterms, 1 final exam.

First two classes. According to the university policy, a student missing first two class meetings "looses the right to remain in the class roll and must formally withdraw from the class". Please, check the policies and regulations in the University Catalog for details and, please, be present.

Deadline to enroll. Subject to availability you can add to this course within first three weeks. Starting from week four new enrollment will be allowed only in exceptional circumstances.

Deadline to drop. Last day to drop with no questions asked is October 17, 2003. After this date dropping the class will be permitted only in exceptional circumstances.

Final. This course has a common final which falls on Friday, December 12, 2003, 2pm–4pm. Rooms will be announced later.

Homework and quiz arrangements. Homework problems are listed for each section in the Lecture Schedule attached to the syllabus. The homework will be randomly collected and some subset from the problems will be graded. Generally, you will NOT be knowing when you will be handing in the assignment so, please, have them ready for each class. The purpose of homework is to strengthen your skills and to give you better understanding of the material through practice. (REMEMBER! Doing homework is crucial for you performance: normally a B requires working out at least 85% of problems.)

Absence from exams. Missing a midterm is permitted only for the most compelling reason. Except in extraordinary situations, permissions should be obtained in advance from the professor to miss an exam; otherwise you will be awarded a 0. If you are excused from taking a midterm, you course grade will be determined by giving extra weight to the final exam. Except in extremely exceptional situations, a student who misses the final exam fails the course.

Incompletes. These are given only in exceptional circumstances. The student must have satisfactorily completed all but a small portion of the work in the course, have a compelling reason for the incomplete, and must have a prior arrangements with the professor for how the incomplete will be removed, well before the end of the term.

Grading policy.

Your course grade is based on (assuming that all grades are made out of 100):

1) Each from three midterms will give you 15% of your Semester Grade;

2) An accumulated grade for completing the homework is 15% of Semester grade;

3) Your performance on the final exam: The grade for the final is 40% of the Semester Grade.

Again, the final exam makes 40%, each midterm makes 15%, and homework makes 15% of the Semester Grade.

Bonus Rule: If the Semester Grade turns out to be less then the grade for the final, then *the grade for the final will be the grade for the course.* In other words, you will always have the highest from two grades.
Note: An S is equivalent to C or better.

Week 1, August 25 — August 29, 2003

M	2.1: Functions, function notation. Domain and range. Graphs. Even and odd functions. 2.2: Operations on functions. Composition of functions.
	HW **2.1**: 4,7,9,13,27,29; **2.2**: 3,13,23; LE **2.1**: 10,14; **2.2**: 4,12.
W	2.4: An introduction to limit. One sided limits. Geometrical interpretation.
	HW **2.4**: 29,30,31,38,39; LE **2.4**: 32,33,37.
F	2.5: Limit of a function: precise definition. ε–δ language. One-sided limits
	HW **2.5**: 1,3,5,7,9,11,12,14,17,18,19; LE **2.5**: 4,6,8,10,13,17.

Week 2, September 1 — September 5, 2003

M	Labor day: no classes.
W	2.6: Limit theorems. The squeeze theorem.
	HW **2.6**: 4,5,7,10,13,15,17,19,21,25,27,33,36(b),39,42; LE **2.6**: 6,14,18,22,28,35,36(a),40.
F	2.7: Limits Involving Trigonometric functions. Special Trigonometric limits.
	HW **2.7**: 1,3,5,7,9,11,13,15,18(a,b); LE **2.7**: 2,4,6,8,10,16.

Week 3, September 8 — September 12, 2003

M	2.8: Limits at infinity. Infinite limits. Relation to asymptotes
	HW **2.8**: 1,5,7,11,15,17,19,23,24,26,31,32,37,39,45,49(a,b,d); LE **2.8**: 2,4,8,10,18,20,25,32,38,49(c,e).
W	2.9: Continuity of functions. Composite limit theorem. Intermediate value theorem.
	HW **2.9**:1,3,5,7,9,11,13,14,16,19,21,23,24,29,33,35,36,39 (??? 41,42); LE **2.9**: 2,6,12,18,20,26,28,34, 38,47.
F	Midterm ♯ 1.

Week 4, September 15 — September 19, 2003

M	3.1: Tangent line. Average and instantaneous velocity.
	HW **3.1**: 9,11,13(a,b),14(a,c); LE **3.1**: 10,12.
W	3.2: The derivative. Differentiability and continuity.
	HW **3.2**: 7,13,19,23,25,27,29,30,33,35,41,48 (?? 49,50); LE **3.2**: 10,14,20,26,28,34,36.
F	3.3 Derivatives of a power function. Rules for finding derivatives.
	HW **3.3**: 7,9,13,15,19,21,37,39,41,43,45,49,51,53 (?? 47,48); LE **3.3**: 10,14,38,44,46,50,50,52.

Week 5, September 22 — September 26, 2003

M	3.4: Derivatives of trigonometric function.
	HW **3.4**: 1,3,5,7,9,11,13,16,19,21,22 (?? 25); LE **3.4**: 2,8,10,12,20,23.
W	3.5: The chain rule.
	HW **3.5**: 1,3,5,7,9,11,13,15,17,19,21,25,27,29,33,35,37,39,48,51; LE **3.5**: 2,6,10,12,14,18,24,34,38,40.
F	3.6 Leibnitz notation. Partial proof of chain rule.
	HW **3.6**: 1,5,7,9,11,13,15,17,19,21,23,25 (?? 40); LE **3.6**: 2,6,10,12,14,18,26.

Week 6, September 29 — October 3, 2003

M	3.7: Higher-order derivatives. Mathematical modeling.
	HW **3.7**: 1,3,5,7,9,11,13,15,20,29,36; LE **3.7**: 2,6,12,14,17,19,30.
W	3.8: Implicit differentiation. Power rule.
	HW **3.8**: 1,3,5,7,9,11,13,15,17,19,21,23,27,29,31,33,38,43; LE **3.8**: 2,8,12,14,18,22,26,30,32,34,39,42.
F	3.9: Related rates.
	HW **3.9**: 1,5,7,21,30; LE **3.9**: 2,6,20

Week 7, October 6 — October 10, 2003

M	3.10 Differentials and approximations. Absolute and relative error.
	HW **3.10**: 1,3,5,7,9,10(a),23,27,32,37; LE **3.10**: 2,8,12(a),24,28,36(b)
W	Review Chapter 3.
F	Midterm ♯ 2

Week 8, October 13 — October 17, 2003

M	4.1: Maxima and minima. Critical points.
	HW **4.1**: 1,3,5,7,9,11,13,15,21,23,27; LE **4.1**: 2,8,12,14,22,30.
W	4.2: Monotonicity and concavity. Second derivative and concavity. Inflection points.
	HW **4.2**: 1,5,7,9,11,13,17,24,25,29,31,33,43; LE **4.2**: 2,8,10,12,14,18,26,32,44.
F	4.3: Local maxima and minima. First derivative test. Second derivative test.
	HW **4.3**: 3,5,11,15,17,20,23,25,27 (?? 28,29); LE **4.3**: 4,14,16,19,24.

Week 9, October 20 — October 24, 2003

M	4.4: More max-min problems.
	HW **4.4**: 1,3,5,7,12,32; LE **3.1**: 2,4,6,8,16.
W	4.6: Sophisticated graphing.
	HW **4.6**: 3,9,11,13,17,19,23,25,29,31,32,33,37,41; LE **4.6**: 6,10,12,18,24,26,30,38,40.
F	4.7 The mean value theorem for derivatives.
	HW **4.7**: 1,3,9,15,12,14,17,18,2,22,27,40 (?? 35,41,42); LE **4.7**: 2,4,8,16,19,20,28.

Week 10, October 27 — October 31, 2003

M	5.1: Antiderivative. Antiderivatives of elementary functions. Laws for sum and difference.
	HW **5.1**: 1,3,5,7,9,13,15,17,19,21,23,25,27,29,31,32,33,35,37,39; LE **5.1**: 2,10,16,18,22,26,28,30,34, 36,40.
W	5.2: Introduction to differential equations. Separation of variables
	HW **5.2**: 1,3,5,7,9,11,13,29; LE **5.2**: 2,4,6,8,10,14,28.
F	5.3: Sums and sigma notation.
	HW **5.3**: 1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31,33,34,37; LE **5.3**:2,4,6,8,10,12,14,16,20,22,26, 32,36.

	Week 11, November 3 — November 7, 2003
M	5.4: Introduction to area. Area by inscribed polygons.
	HW **5.4**: 7,11,13,14; LE **5.4**: 8,12.
W	5.5: Riemann sum. The definite integral. Interval additive property.
	HW **5.5**: 2,4,7,9,11,13,15,17,19,21,23(a,c,g),24(a,c,e),25; LE **5.5**: 8,10,12,14,18,20,23(b,h), 24(b,f).
F	5.6: The first fundamental theorem of Calculus. Comparison properties.
	HW **5.6**: 5,7,9,13,17,19,21,23,27,31,39,41,45,47; LE **5.6**: 8,10,12,14,18,20,23(b,h),24(b,f)
	Week 12, November 10 — November 14, 2003
M	5.7: The second fundamental theorem of calculus. The mean value theorem for integrals.
	HW **5.7**: 1,3,5,7,9,11,15,17,19,21,23,25,27,29,31,33,35,37,43,45,47,49,52; LE **5.7**: 2,6,8,10,12,16,24, 26,28,32,34,38,46,48,54.
W	5.8: Evaluating definite integrals. Substitution rule. Symmetric and periodic functions.
	HW **5.8**: 1,5,7,9,13,15,17,19,29,31,33,35,37,41,45,49,51,53,55,59(?? 57,58); HW **5.8**: 2,10,12,14,20, 26,32,34,36,42,46,52,54,60.
F	Midterm ♯ 3
	Week 13, November 17 — November 21, 2003
M	7.1: The natural logarithm function. Properties of logarithm. Logarithmic differentiation.
	HW **7.1**: 3,5,11,15,17,19,21,23,25,27,29,30,31,33,35,43,46(a); LE **7.1**: 4,6,12,16,18,20,26,28,32,36.
W	7.2: Inverse functions and their derivatives.
	HW **7.2**: 7,9,10,13,15,17,25,27,37,39(?? 41); LE **7.2**: 8,14,18,26,38.
F	7.3: The natural exponential function.
	HW **7.3**: 3,5,7,9,11,13,15,17,19,21,25,27,29,31,33,40; LE **7.3**: 6,10,12,14,20,22,28,30,36.
	Week 14, November 24 — November 28, 2003
M	7.4: General exponential and logarithmic functions. Derivative of x^x.
	HW **7.4**: 3,5,7,17,19,23,25,27,29,31; LE **7.4**: 4,8,18,20,24,28,30,32.
W	7.7: The inverse trigonometric functions and their derivatives.
	HW **7.7**: 9,19,21,23,25,27,28,29,31,33,37,39,41,43,45,47,51,55,57,58; LE **7.7**: 10,20,24,26,30,32,34, 36,38,40,48,52,56.
F	Thanksgiving Recess.
	Week 15, December 1 — December 5, 2003
M	Review
W	Review
F	Review
	Final: December 12, 2003, 2pm–4pm.