

Department of Kinesiology  
San José State University

**KIN 154B**

**Electrocardiogram Interpretation & Graded Exercise Testing**

Sections 1 & 2      MW 12:30-2:20 pm      SPX 208  
**Spring 2012**

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Office Hours: M, W 10:00 - 11:30 am

T, Th 11:15 - 11:45 am

T, Th 2:00 - 2:30 pm

Other times available by appointment

TAs: Rucha Ganatra

Kristina Klaas

**Description:** Theoretical background and practical proficiency in the methods and instruments of electrocardiogram (ECG) interpretation and graded exercise testing (GXT).

**Prerequisites:** KIN 70 & KIN 155 with grades of C- or better  
Human Physiology, Introductory Chemistry, GE Math  
Current CPR certification - completed prior to end of semester  
(hands-on training with card required)

**Student Learning Objectives (SLOs)**

Upon successful completion of the course requirements, the student will:

- (1) demonstrate knowledge of cardiac anatomy and physiology.
- (2) demonstrate knowledge and proficiency in ECG interpretation, including identification of dysrhythmias, and AV and bundle branch blocks.
- (3) demonstrate understanding of the effects that axis changes of depolarization; hypertrophy of the heart; and myocardial ischemia, injury, and infarctions have on the ECG.
- (4) understand and apply guidelines for evaluation of health status prior to GXT and exercise programming, including identifying abnormalities and conditions that are contraindications for GXT and/or exercise.
- (5) demonstrate understanding of the benefits and risks associated with exercise, and legal issues related to exercise testing and programming.
- (6) identify and describe safe endpoints for GXTs.
- (7) understand and identify normal and abnormal GXTs, as well as false positive and false negative tests.
- (8) demonstrate knowledge and proficiency in graded exercise testing methods, instrumentation, and protocols.
- (9) demonstrate an understanding of (and proficiency in) emergency medical procedures that may be necessary during a GXT or exercise session.
- (10) demonstrate an understanding of how data from a GXT reflect current physiological functioning and may be used in exercise programming for healthy individuals.
- (11) demonstrate the ability to explain and interpret ECG and GXT results.
- (12) observe and compare/contrast clinical or community-based exercise testing with GXT procedures learned in class.
- (13) demonstrate sensitivity to age, gender, cultural, and other individual differences that may affect the ECG, GXT, and exercise programming.

## Requirements & Expectations

1. Textbooks:
  - Thompson, W. R. (Ed.). (2010). *ACSM's guidelines for exercise testing and prescription* (8<sup>th</sup> ed.). Philadelphia: Wolters Kluwer/Lippincott Williams & Wilkins.
  - Wesley, K. (2011). *Huszar's basic dysrhythmias and acute coronary syndromes: Interpretation and management* (4<sup>th</sup> ed.). St. Louis: Elsevier Mosby JEMS.
  - Course Reader: After classroom delivery, available at Maple Press (481 E. San Carlos, 297-1000)
2. Other Materials:
  - Calculator
  - Metric ruler
  - ECG calipers (optional)
3. Professional commitment

This is a professional preparation course. Students are expected to:

- **Be fully prepared; actively and enthusiastically participate** in ALL laboratory sessions and class discussions.
- § **Read assigned material and lab instructions BEFORE class.** (Lecture and lab time will be used to present material, help students master techniques, and check competencies. Students are directed to the green sheet and course reader for answers to many of their procedural questions.)
- § Bring textbook, calculator, course reader, and other necessary supplies to class.
- § Dress appropriately for scheduled activities.
- § Participate in demonstrations and data collection.
- § Enthusiastically assist other students with practice sessions and testing.
- § PRACTICE, PRACTICE, PRACTICE techniques. **Use your class time effectively!** Ask for guidance from instructor if having difficulty mastering a technique.
- § Complete competencies and assignments on time.
- Use equipment properly; clean and put away all equipment before leaving lab area.
- Keep lab clean. No food or drinks are allowed in the lab, except water.
- Silence cell phones during class. Use electronic equipment **ONLY** for class activities (e.g., note taking). Texting, scanning the internet, and checking e-mail during class is unprofessional, disrespectful, and distracting to others.

Students who consistently demonstrate professionalism, as described above, **WILL** be able to complete all lab activities and competencies in a timely manner. Students who choose not to use laboratory time effectively may not complete all assignments, and should not expect the instructor to ensure that they do. Borderline grades may be raised or lowered depending upon student's professional commitment.

The most effective class results when **EACH** class member makes an **INDIVIDUAL COMMITMENT** to be an active participant in the teaching/learning process. Individual contributions and differing viewpoints will be appreciated and respected. Students are responsible for material presented and announcements made in each class. Students who miss class (a rare occurrence!) are responsible for obtaining material from another student **BEFORE** seeing the instructor about content missed.

## University & Department Policies

- § Academic Integrity (from the Office of Student Conduct and Ethical Development): “Your own commitment to learning, as evidenced by your enrollment at San José State University, and the University’s Academic Integrity Policy, requires you to be honest in all your academic course work. Faculty members are required to report all infractions to the Office of Student Conduct and Ethical Development.” The policy on academic integrity can be found at [http://sa.sjsu.edu/student\\_conduct](http://sa.sjsu.edu/student_conduct). Plagiarism and cheating are serious offenses; minimally, the assignment or exam will receive 0 points. Students should carefully read the attached information on academic integrity.
- ! Campus policy in compliance with the Americans with Disabilities Act: “If you need course adaptations or accommodations because of a disability, or if you need special arrangements in case the building must be evacuated, please make an appointment with me as soon as possible, or see me during office hours. Presidential Directive 97-03 requires that students with disabilities requesting accommodations must register with DRC to establish a record of their disability.” DRC: Admin 110, 924-6000
- ! February 6 is the last day to drop this course without a “W” being assigned. According to University policy, dropping this course after Feb. 6 is permissible only for serious and compelling reasons, and requires written documentation. Unsatisfactory performance in course work is not a serious and compelling reason. The last day to add the course is Feb. 13. However, students who receive add codes should use them as soon as possible.
- ! Maximal testing must be supervised by ACSM certified personnel (exercise test technologist, clinical exercise specialist, RCEP, or program director).

## Evaluation

Clinical Observation* (SLO #12, 13)	10%
Self-Assessment: Resting & Sub-Maximal Exercise* (SLO #4, 11)	6%
Self-Assessment: GXT* (SLO #2, 11)	7%
Exercise Programming Case Study* (SLO #10, 13)	3%
Client Assessment* (SLO #2, 4, 10, 11, 13)	12%
Competency Tests* (SLO #8, 9)	10%
GXT Tasks* (SLO #8)	3%
Competency Administering Client Assessment* (SLO #6, 8)	4%
Quizzes (SLO 1-7, 11)	15%
Midterm Exam (SLO 1-7, 11) - Wednesday, March 14	15%
Final Exam (comprehensive) (SLO 1-7, 9, 11) - Thurs., May 17, 12:15-2:30 pm	15%

\* Instructions and data sheets are in the course reader.

## Written Projects (Clinical Observation, Self-Assessments, Client Assessment, Exercise Programming Case Study)

Guidelines for projects are in the course reader. Written work, other than data sheets, must be typed, double spaced, and proofread. (Check for grammar, spelling, and syntax -- if in doubt, look it up!) Grades will be lowered for late assignments as follows:

Due Date	Received	Grade Lowered
Monday	After class Mon. through Wed.	1 grade step (eg, A- → B+)
	Thurs. or Fri.	2 grade steps (eg, A- → B)
	Following Mon.	1 full grade (eg, A- → B-)
Wednesday	After class Wed. through Fri.	1 grade step
	Mon.	2 grade steps
	Tues. or following Wed.	1 full grade

Students must speak with the instructor regarding assignments that are more than 1 week late.

## Competency Tests

Students will demonstrate proficiency in the following:

- Measuring resting blood pressure
- Measuring blood pressure during leg (cycle) ergometry
- Measuring blood pressure during treadmill walking
- 12-lead ECG electrode placement
- Calibration of treadmill speed and elevation
- Calibration of Monark bicycle ergometer

Grading on competency tests: A (95%) = excellent technique (smooth & correct)

B (85%) = good technique, but needs more practice

F (50%) = poor or weak technique, significant errors, questionable data

0 pts = did not attempt competency

Students receiving less than an A grade will receive feedback about errors and may, after further practice, retake the test on another day. If a student does not attempt a test by the first deadline date, the grade may be lowered one letter grade for each week, or part of a week, that the deadline is missed.

Students are responsible for scheduling competency tests during the lab by signing up on the whiteboard when ready to perform the competency. Monday, May 7 is the last day to complete competency testing.

## **GXT Tasks**

Students will be signed off after competently completing each of the following tasks:

- \$ Administering GXT (start to finish)
- \$ Operating metabolic cart
- \$ Prepping client for testing, including ECG
- \$ Obtaining blood pressure during exercise testing
- \$ Obtaining RPE during exercise testing

Grading on GXT Tasks:

5 tasks completed = 3.0 points
4 tasks completed = 2.5 points
3 tasks completed = 2.0 points
2 tasks completed = 1.5 points
1 tasks completed = 1.0 points
0 tasks completed = 0 points

## **Competency Administering Client Assessment**

Students will demonstrate proficiency in administering their clients' GXTs, including:

(a) evaluating medical history prior to assessment day, (b) providing instructions to client and obtaining informed consent, (c) prepping client for testing, (d) obtaining resting measurements, (e) deciding on protocol prior to assessment day, (f) obtaining appropriate measurements during GXT, (g) supervising cool down, (h) administering GXT in a safe and efficient manner, and (i) leaving laboratory and equipment clean after GXT.

## **Quizzes**

Quizzes will cover lecture and reading material. Scantrons may be required (type TBA). The lowest quiz score will be dropped. In most cases, make-up quizzes will not be permitted; however, decisions will be made on an individual basis. If a make-up is permitted, it must be completed before the next class meeting.

## **Midterm & Final Exams**

A scantron (type TBA) and #2 pencil are needed for the midterm and final exams. Exams may include true-false, multiple choice, matching, and short answer questions and problems. Exams are to be taken on the dates scheduled. The final exam will NOT be given early. Make-up exams are permitted only for illness and emergency (TRULY EXTRAORDINARY CIRCUMSTANCES). The student is responsible for notifying the instructor and making arrangements at the earliest possible time. In most cases, the exam must be completed before the next class meeting. All requests for make-up exams will be evaluated on an individual basis.

## Grading

Grading is based on percentage of total points earned as follows:

97-100%	(98%) A+	77-79%	(78%) C+
93-96%	(95%) A	73-76%	(75%) C
90-92%	(91%) A-	70-72%	(71%) C-
87-89%	(88%) B+	67-69%	(68%) D+
83-86%	(85%) B	63-66%	(65%) D
80-82%	(81%) B-	60-62%	(61%) D-
		Below 60%	(≤50%) F

In parentheses are values used when converting letter grades to percentages.

### Example

Component	% Earned	%	X	Points Possible	=	Points Earned	
Clinical Observation	88%	.88	X	10	=	8.8	
Self-Assessment: Resting & Sub-Max Exercise	85%	.85	X	6	=	5.1	
Self-Assessment: GXT	82%	.82	X	7	=	5.74	
Exercise Programming	93%	.93	X	3	=	2.79	
Client Assessment	90%	.90	X	12	=	10.8	
Competency Tests	95%	.95	X	10	=	9.5	
GXT Tasks	100%	1.00	X	3	=	3.0	
Competency-client assmt.	90%	.90	X	4	=	3.6	
Quizzes (average %)	82%	.82	X	15	=	12.3	
Midterm Examination	78%	.78	X	15	=	11.7	
Final Examination	90%	.90	X	15	=	13.5	
						86.83	
						Grade: B+	



The following information on academic integrity has been excerpted from the San José State University Academic Integrity Policy (policy F06-1). The complete policy is available at [http://sa.sjsu.edu/student\\_conduct](http://sa.sjsu.edu/student_conduct).

“Your own commitment to learning, as evidenced by your enrollment at San José State University, and the University’s Academic Integrity Policy requires you to be honest in all your academic course work. Faculty members are required to report all infractions to the Office of Student Conduct and Ethical Development.”

### **SAN JOSE STATE UNIVERSITY ACADEMIC INTEGRITY POLICY**

The University emphasizes responsible citizenship and an understanding of ethical choices inherent in human development. Academic honesty and fairness foster ethical standards for all those who depend upon the integrity of the university, its courses, and its degrees. This policy sets the standards for such integrity and shall be used to inform students, faculty and staff of the university’s Academic Integrity Policy. The public is defrauded if faculty and/or students knowingly or unwittingly allow dishonest acts to be rewarded academically, and the university’s degrees are compromised.

#### **Student Role**

It is the role and obligation of each student to:

1. Know the rules that preserve academic integrity and abide by them at all times. This includes learning and following the particular rules associated with specific classes, exams and/or course assignments. Ignorance of these rules is not a defense to the charge of violating the Academic Integrity Policy.
2. Know what the consequences of violating the Academic Integrity Policy will be, students’ appeal rights, and the procedures to be followed in the appeal.
3. Foster academic integrity among peers.

## **1.0 Definitions of Academic Dishonesty**

### **1.1 Cheating**

At SJSU, cheating is the act of obtaining or attempting to obtain credit for academic work through the use of any dishonest, deceptive, or fraudulent means. Cheating at SJSU includes, but is not limited to:

- 1.1.1 Copying, in part or in whole, from another's test or other evaluation instrument including homework assignments, worksheets, lab reports, essays, summaries, quizzes, etc.;
- 1.1.2 Submitting work previously graded in another course unless this has been approved by the course instructor or by departmental policy;
- 1.1.3 Submitting work simultaneously presented in two courses, unless this has been approved by both course instructors or by the department policies of both departments;
- 1.1.4 Using or consulting, prior to, or during an examination, sources or materials not authorized by the instructor;
- 1.1.5 Altering or interfering with the grading process;
- 1.1.6 Sitting for an examination by a surrogate, or as a surrogate;
- 1.1.7 Any other act committed by students in the course of their academic work which defrauds or misrepresents, including aiding or abetting in any of the actions defined above.

### **1.2 Plagiarism**

At SJSU, plagiarism is the act of representing the work of another as one's own without giving appropriate credit, regardless of how that work was obtained, and/or submitting it to fulfill academic requirements. Plagiarism at SJSU includes, but is not limited to:

- 1.2.1 The act of incorporating the ideas, words, sentences, paragraphs, or parts of, and/or the specific substance of another's work, without giving appropriate credit, and/or representing the product as one's own work;
- 1.2.2 Representing another's artistic/scholarly works such as musical compositions, computer programs, photographs, paintings, drawing, sculptures, or similar works as one's own.

## **2.0 Notification of Standards of Detecting Plagiarism**

- 2.1 SJSU or its faculty may subscribe to and/or use plagiarism detection services.

## PROPOSED SCHEDULE

(Subject to change with fair notice – changes will be announced in class)

Date	Topic	Reading Assignments
Wed., Jan. 25	Introduction & course overview, cardiac anatomy & physiology	
Mon., Jan. 30	Cardiac anatomy & physiology, resting blood pressure	Wesley - Chap. 1 ACSM - pp. 46-48 CR - Assessing BP
Wed., Feb. 1	Benefits and risks associated with exercise, health screening & risk stratification	ACSM- Preface, Chaps. 1, 2 (delete AHA risk stratification & stratification for cardiac patients)
Mon., Feb. 6	Exercise blood pressure, treadmill & bicycle operation & calibration <b>QUIZ #1</b> (Cardiac anatomy & physiology)	ACSM - pp. 302-303 CR - Bicycle calibration
Wed., Feb. 8	Electrode placement, electrocardiograms, normal sinus rhythm	Wesley – Chaps. 2 (skip modified chest leads), 3, 11 (skip right-sided chest leads) ACSM - pp. 303-305
Mon., Feb. 13	ECG interpretation <b>QUIZ #2</b> (Benefits & risks of exercise, health screening & risk stratification, resting BP) <b>COMPETENCY TEST:</b> Resting BP	Wesley - Chap. 4
Wed., Feb. 15	Contraindications, informed consent, pretest instructions, QRS axis	ACSM - pp. 42-45, 53-58 Wesley - Chap. 12, pp. 343-348
Mon., Feb. 20	Measuring VO <sub>2</sub> , metabolic cart, emergency management, GXT <b>QUIZ #3</b> (Electrode placement, electrocardiograms, normal sinus rhythm)	ACSM - pp. 60-62, 71-83, 105-123, 135-144, Appendix B CR - Lear et al., 1999
Wed., Feb. 22	Sinus dysrhythmias, GXT <b>COMPETENCY TEST:</b> Electrode placement	Wesley - Chap. 5
Mon., Feb. 27	Sinus dysrhythmias, GXT <b>QUIZ #4</b> (QRS axis, contraindications, informed consent, pretest instructions)	

Wed., Feb. 29	Atrial dysrhythmias, GXT <b>COMPETENCY TEST:</b> Exercise BP (cycle or treadmill) <b>DUE: Self-Assessment: Resting &amp; Submaximal Exercise</b>	Wesley - Chap. 6
Mon., Mar. 5	Atrial & junctional dysrhythmias, GXT <b>QUIZ #5</b> (Sinus dysrhythmias)	Wesley - Chap. 7
Wed., Mar. 7	Data interpretation, exercise programming, behavior change, GXT	ACSM - pp. 84-85 (Table 4.8), 152-167, 175-180
Mon., Mar. 12	Catch-up & review	
Wed., Mar. 14	<b>MIDTERM EXAM</b>	
Mon., Mar. 19	Ventricular dysrhythmias, GXT	Wesley - Chap. 8 ACSM - p. 307
Wed., Mar. 21	Ventricular arrhythmias, GXT <b>DUE: Exercise Programming Case Study</b>	
Mon., Mar. 26	<b>SPRING BREAK</b>	
Wed., Mar. 28	<b>SPRING BREAK</b>	
Mon., Apr. 2	GXT <b>QUIZ #6</b> (Ventricular dysrhythmias) <b>COMPETENCY TEST:</b> Treadmill or bicycle calibration	
Wed., Apr. 4	Ischemia & infarct, GXT <b>DUE: Self-Assessment: GXT</b>	Wesley - Chap. 16 ACSM - pp. 135-144, 306 CR - ACSM Certified News
Mon., Apr. 9	Ischemia & infarct, GXT <b>QUIZ #7</b> (TBA)	
Wed., Apr. 11	TBA, GXT	
Mon., Apr. 16	AV blocks, GXT <b>QUIZ #8</b> (Ischemia & infarct)	Wesley - Chap. 9 ACSM - pp. 308-309
Wed., Apr. 18	AV blocks, GXT <b>DUE: Clinical Observation</b>	
Mon., Apr. 23	Bundle branch blocks, GXT <b>QUIZ #9</b> (AV blocks)	Wesley – Chap. 13 (skip hemiblocks & fascicular blocks)
Wed., Apr. 25	Bundle branch blocks, GXT	

Mon., Apr. 30	Cardiac enlargement, GXT <b>QUIZ #10</b> (Bundle branch blocks)	Wesley – Chap. 15 (chamber enlargement & hypertrophy only)
Wed., May 2	Clinical exercise testing, exercise testing with imaging, sensitivity & specificity, legal issues <b>DUE: Client Assessment</b> <b>DUE: GXT Tasks Completed</b>	ACSM - pp. 123-132, 145-148 CR - Nuclear imaging
Mon., May 7	TBA <b>QUIZ #11</b> (Cardiac enlargement) <b>Last Day to Complete Competency Testing</b>	
Wed., May 9	TBA	
Mon., May 14	Catch-up, summary & review	
Thurs., May 17 12:15-2:30 pm	<b>FINAL EXAM</b>	

CR = Course Reader