**STANDARD COURSE OUTLINE**

**College of Liberal Arts, Department of Geography**

**I General Information**

A. Course Number: 130
B. Title: Introduction to Climatology
C. Units: 4
D. Prerequisites or corequisites: One G.E. Foundation course. One B.2 and one A.1 course recommended.
E. Responsible Faculty: C.M. Rodrigue, S. Dallman, P. Laris, C. Lee, S. Wechsler
F. SCO prepared by: Christine M. Rodrigue
G. Date of Submission/Revision: Spring 2009 *(03/17/09*)

**II Catalog Description**

Introduction to Earth's atmosphere, weather processes, global climate patterns, drivers of climate change and their interactions with the biotic and abiotic environment. Analysis of how human activities affect weather and climate processes and the patterns of global climate impacts.

(3 hours lecture, demonstration activity, 2 hours laboratory and field activity)

**III Curriculum Justification**

The proposed course is a *GE course in the Explorations category of B.1.b.* (Physical Sciences with Laboratory: *3 units at C3 and 1 unit at C13*.

One of the major subdivisions of physical geography is the study of weather processes, climate patterns, and the drivers and impacts of climate change on biotic and abiotic environments. It is a *physical science* that imparts knowledge of the physicochemical processes occurring in the atmosphere to generate everyday weather events and hazards, more persistent climate configurations, and climate change over a variety of temporal and spatial scales. It is an integrative science in that these patterns and processes are affected by human activities and impact the biotic and abiotic environments at many spatial and temporal scales. Physical geographers utilize a distinct methodological approach incorporating techniques from Geographic Information Science (GIScience), including geospatial analysis tools (*e.g.,* geographical information systems, remote sensing, cartography, GPS, and spatial statistics), as well as more traditional physical science methods and tools. This methodology is used to develop the evidence needed for testing hypotheses about the physicochemical principles and interactions among weather, climate, climate change, and ecodynamics.

Understanding the physical and chemical processes behind global climate change, and the associated impacts, is increasingly critical to contemporary world civilization. CSULB alumni will need to evaluate the issues critically and from an integrative and scientifically-grounded perspective. GEOG 130 is meant to provide CSULB General Education students an appropriate breadth of knowledge about these issues while practicing all of the shared Foundational Intellectual and Practical Skills, specifically emphasizing quantitative reasoning.

Additionally, the Department of Geography has been reviewing and redesigning its major curriculum in response to two internal assessment projects (2001, 2006) and its most recent Self-Study (2007). We seek to create a better sequence of concepts and skills learned, so that students are first introduced to them in the lower division, then practice them in 300 level gateway courses, and later master them at an advanced level within their concentrations. In terms of understanding weather, climate, climate change processes, and ecodynamics, we wish to create a solid introduction to the physical science of global climate change at an earlier stage in their education, from which they can then take the gateway 340 course in environmental geography, and then the advanced major courses in climatology (GEOG 444), palæoclimatology (GEOG 445), and humans as agents of environmental change (GEOG 455). GEOG 130 will allow GEOG 444, 445, and 455 to go forward on a solid introduction to weather, climate, climate change, and ecodynamics.

GEOG 130 provides highly skilled tenured and probationary faculty with important teaching and research opportunities. The Department is home to five Ph.D.s in physical and environmental geography, and GEOG 130 is a way for them to share their expertise with the lower-division students on a topic of salient visibility and great social importance.

Given competing demands on our labs, facilities, and faculty, we anticipate building out to 4 sections of GEOG 130 each semester.

**IV Measurable Student Learning Outcomes, Evaluation Instruments, and Instructional Strategies for Skill Development:**

**A. Measurable Student Learning Outcomes (SLOs)**

Successful completion of the course demonstrates student achievement of the following GE Content-based SLO and two Shared Intellectual and Practical Skill SLOs:

1. **content understanding of physicochemical processes** giving rise to weather events, climate types, and climate change, and mediate their interactions with the biotic and abiotic environment (ecodynamics)
2. competence in applying **quantitative reasoning skills** to the analysis of meteorological processes, climatological systems, and ecodynamics
3. proficiency in **scientific communication skills** (*i.e.,* written communication, including graphic communication, and oral communication skills)

Each of these three objectives can be measured through several student performance benchmarks, associated evaluation instruments, and instructional strategies for skill development.

**B. Student Performance Benchmarks**

1. In order to demonstrate **content understanding of meteorological, climatological, and ecodynamic processes**, students will show they can use their **creativity** and **inquiry** to **discover** how to :
   a. **describe** the composition and structure of the atmosphere
   b. **explain patterns of heat and water flux** in terms of Earth's radiation balance, thermodynamic and hydrostatic processes, surface-atmosphere interactions, diffusion, and forces acting on air in motion
   c. **interpret** everyday and extreme weather events in terms of these fluxes and forces and **differentiate** storm mechanisms by latitude and scale
   d. **distinguish weather from climate** using statistical concepts
   e. **classify climates and biomes** and **explain their distributions** in terms of latitude, proximity to the ocean, ocean circulation, general atmospheric circulation, and topography
   f. **trace the climate history** of the earth and its impacts on the biotic and abiotic environment with increasing detail toward the present, **discuss common data proxies** used to reconstruct it, and **review physical processes used to explain** climate change
   g. **appraise uncertainties** in predicting climate change and **differentiate** between scientific uncertainties and political manipulation of these uncertainties by interested parties
   h. **apply** climatological and ecodynamical concepts and data to **estimate specific impacts** of global warming and **argue their plausibility**
   i. **interpret remotely sensed images** of temperature, humidity, ice pack conditions, live fuel moisture conditions, and other physical features of relevance to weather, climate, and climate change and ecodynamic responses

2. In order to demonstrate competence in applying **quantitative reasoning skills** to the analysis of meteorological, climatological, and ecodynamic systems, students will show that they can:
   a. **recall and perform basic arithmetic and algebraic skills** in such contexts as calculating map scales; converting among radius, circumference, and area; and inferring distances and relationships among features on maps from scales
   b. **organize and analyze** weather and climate data with graphs, maps, and basic descriptive statistics (central tendency, variation, skew, and spatial versions of these), in order to assess the relative sizes, locations, and importance of relevant quantities (*e.g.,* heat, humidity, precipitation)
   c. **recognize mathematical structures** among weather and climate data by interpreting tables, graphs, maps, and charts using simple linear equations and spatial/temporal interpolation
   d. **synthesize ideas** from the subject matter of the course to **generate hypotheses** about climate and weather patterns, climate change forcings, and ecodynamic interactions and then test them against instrumental weather data (both archival and field-collected), proxy climate data, and biogeographical distributions
   e. **evaluate their hypotheses** through statistical decision-making grounded in the balance of uncertainties (significance, sampling error, bias, and the possible consequences of Type I and Type II errors,)
   f. **critique** their own and others' use of weather and climate data, mathematical and statistical descriptions and extrapolations of them, and arguments (assumptions, reasoning, and conclusions) about climate change and ecodynamics

3. In order to demonstrate proficiency in **scientific communication <u>skills</u>**, *i.e.,* written (including graphic) and oral communication skills, students will show that they can:
   a. apply the elements of effective **map communication** of features and processes in the physical landscape, atmosphere, and the interfaces between them
   b. apply the elements of effective **graphic communication** of scientific content through construction of several types of graphs and tables and, optionally, assembly of these into posters and/or viewgraph (*e.g.,* PowerPoint) presentations
   c. apply the elements of effective **written textual communication** of lab and field analyses through logical and succinct written reports
   d. apply the elements of effective **oral communication** of lab and field analyses through lab group discussions and, optionally, illustrated oral presentations

### C. Evaluation Instruments (assignments)

| Measurable Student Learning Outcomes | Representative Evaluation Instruments |
|---|---|
| 1. *demonstrate **<u>content</u> understanding** of climatological and ecodynamic processes, through application of **creativity, inquiry**, and **discovery <u>skills</u>*** | |
| a. *describe* the composition and structure of the atmosphere | • Exam questions on atmospheric gasses<br>• Lab projects relating energy absorption spectra of various gasses to the vertical temperature structure of the atmosphere |
| b. *explain* patterns of heat and water flux | • Essay questions on how the laws of thermodynamics apply to air masses<br>• Lab problems applying the gas laws and the hydrostatic equation to the motion of air<br>• Lab problem applying the water phase diagram and the gas laws to moisture extraction from an air mass |
| c. *interpret* weather events and spatially *differentiate* storm mechanisms | • Lab projects reading weather maps, recognizing common storm types and structures within the storms, and predicting weather at various points around them<br>• Exam essay comparing and contrasting storm mechanisms from two or more latitudinal belts |
| d. *distinguish* weather from climate | • Essay question on exam<br>• Lab project calculating means and standard deviations for instrumental weather records and constructing climographs |
| e. *classify* climates and biomes and *explain* their distributions | • Exam question classifying weather stations' climates using climographs<br>• Lab project mapping climate and biome types applying Köppen, Thornthwaite, and/or Bailey systems |
| f. *trace* climate history, discuss common data proxies, review physical processes used to explain climate change | • Lab project using one of the palæoclimate proxy datasets at NOAA's online archives<br>• Exam questions about sequence of global climate changes over the Pleistocene/Holocene |
| g. *appraise* uncertainties in global climate change and distinguish scientific uncertainties from political manipulation | • Essay exam question<br>• Report based on articles in *Scientific American* or similar journals |
| h. *apply* concepts and data to estimate specific impacts and argue their plausibility | • Project and paper using climate data and maps to research a specific predicted impact of climate change |
| i. *interpret* remotely sensed images | • Lab on polar sea ice changes through time using decades of DMSP SSM/I imagery<br>• Lab on ozone hole changes through time using decades of TOMS and OMI data |

| 2. *demonstrate competence in applying* ***quantitative reasoning <u>skills</u>*** *to the analysis of meteorological, climatological, and ecodynamic systems* | |
|---|---|
| a. *recall and perform* basic arithmetic and algebraic skills | • Exam question calculating precipitation means, ranges, and standard deviations from weather data for Long Beach<br>• Lab projects converting map scales and contour intervals, using them to calculate distances among weather stations, slope angles among their elevations, and areas within polygons defined by their locations |
| b. *organize and analyze* weather and climate data | • Lab project classifying point distributions on a remotely sensed image (*e.g.,* plants) as clustered, random, or uniform with nearest neighbor analysis and relating the distributions to precipitation patterns<br>• Lab project calculating means and standard deviations for instrumental weather records and constructing climographs |
| c. *recognize* mathematical structures among weather and climate data | • Lab problem using simple linear correlation and regression analysis to describe the association between two scalar variables (*e.g.,* snowfall and distance from Lake Erie , annual precipitation levels and variability)<br>• Lab using Chi-square and Yule's Q tests to evaluate the spatial associations of two point or area variables in a study area (either archival or field data, *e.g.,* slope aspect and vegetation type as a surrogate for microclimate conditions) |
| c. interpolate missing values from a spatial field of known values (Kriging) or through an equation | • Exam questions inferring values and spatial patterns from isoline maps (*e.g.,* barometric pressure, precipitation, insolation)<br>• Exam questions applying the inverse square law and trigonometry to the solar constant, orbital eccentricity and seasonality, and the distribution of insolation intensity by latitude and season |
| d. *calculate* scales of maps and infer distances and relationships among physical features from maps | • On campus field project on surveying and manual mapping of points at which physical data are collected (*e.g.,* temperature and relative humidity using a sling psychrometer)<br>• Map reading project calculating rise and run (pressure gradient) between two points on an air pressure map, combining that information with Coriolis Effect to infer wind direction and relative strength at different locations. |

| 3. *demonstrate proficiency in* ***scientific communication <u>skills</u>*** *(written skills, including graphic, communication skills and oral communication skills)* | |
|---|---|
| a. apply the elements of effective *map communication* of physical features and processes in the physical environment | • Several labs require the production of maps<br>• At least one project will specifically focus on weather or climate map design, projections, symbology, comformality and equal-area trade-offs, and clutter |
| b. apply the elements of effective *graphic communication* of scientific content through construction of several types of graphs and tables | • Most labs and reports require the production of graphs, such as histograms, pie charts, line charts, scatterplots, box and whisker plots, and fitted curves<br>• Exams require the processing of data in tables or spreadsheets |
| c. apply the elements of effective *written communication* of lab and field analyses through logical and succinct written reports | • All labs and field assignments require write up of results, so students will get multiple opportunities for feedback on writing development<br>• There is at least one formal report on which writing mechanics and quality of sources are evaluated |
| d. apply the elements of effective *oral communication* of lab and field analyses through spoken presentations or discussions | • Required group discussions and lab work inherently foster verbalization of questions, hypotheses, and problems<br>• The optional oral or poster presentation will provide extra opportunity to present and illustrate results, using the succinct viewgraph (*e.g.,* PowerPoint) or poster format so common in most sciences |

**D. Instructional Strategies for Skill Development**

| *Measurable Student Learning Outcomes and Desired Skills* | *Instructional Strategies for Skill Development* |
|---|---|
| 1. demonstrate content understanding of meteorological, climatological, and ecodynamic processes | a. in course discussions and laboratory assignments require students to verbalize their understanding of the patterns and processes being considered<br>b. at least 1 formal report will give students an in-depth opportunity to research, conceptualize, organize, and critically analyze a weather, climate, climate change, or ecodynamic topic using original or archival data<br>c. lab projects and exam questions will give students the chance to demonstrate quantitative understanding of weather and climate patterns and processes<br>d. students will be expected to apply concepts to problems in quantitative, mapping, and writing projects (*e.g.,* report, labs, exams, and optional talk) |
| 2. demonstrate confidence in applying quantitative reasoning skills to the analysis of meteorological, climatological, and ecodynamic systems | a. all lab assignments and every exam will give students the chance to recall and apply arithmetic, algebraic, and geometric skills to organize and analyze data and spatial distributions of weather and climate phenomena<br>b. labs will coach students in handling basic linear, exponential, and logarithmic equations to describe, predict, and test hypothesized physical patterns and processes<br>c. exam questions, labs, and a report will specifically give students practice in formal statistical hypothesis testing<br>d. several lab assignments will entail interpretation of maps and equations to interpolate expected values from a limited field of known values or mathematical relationships |
| 3. demonstrate proficiency in scientific communication skills (written, including graphic, communication skill and oral communication) | a. map construction will recur in several lab projects and an on-campus fieldwork experience, and feedback will be provided so that students can incrementally develop their mapping skills<br>b. all labs have the students construct graphs and tables to report their results, allowing students to practice making several types of graphics and understand which are better suited to particular communication purposes<br>c. there are so many small lab and field writeups that students will get multiple and progressive feedback to improve their writing skills, leading up to a formal paper<br>d. an optional oral presentation will allow students to acquire and hone skills in speaking in front of peers and supporting their arguments with viewgraphs (*e.g.,* PowerPoints) |

**V Outline of Subject Matter:**

This is a broad outline of topics to be covered. Subject matter and sequence of topics may vary by instructor, as may duration.

**Meteorological, climatological, and ecodynamic topics (± 1 week on each main topic)**

- Physical meteorology basics (~2 weeks)
  - Earth in space, electromagnetic spectrum, solar radiation, and Earth radiation
  - Vertical structure of pressure, temperature, atmospheric chemistry, and ionization
  - Gas laws, hydrostatic equation, water phase diagram, stability and instability
  - Thermodynamics, adiabatic processes, lapse rates, molecular and turbulent diffusion, surface-atmosphere interactions, clouds, fogs, precipitation
- Dynamical meteorology basics (~2 weeks)
  - Potential and kinetic energy, momentum, vorticity, conservation laws
  - Forces on air in motion:
    - Pressure gradient and Coriolis forces and geostrophic winds
    - Centrifugal force and gradient winds
    - Friction and boundary layer winds
  - Waves: Rossby and frontal

- Synoptic, mesoscale, and local meteorology basics (~2 weeks)
  - Reading surface and upper air charts
  - Pressure variations: cyclones and anticyclones
  - Air mass and front analysis
  - Storm types by latitude:
  - Weather processes, patterns, and forecasting
  - Mesoscale and local scale systems (monsoonal and local circulation systems)
- Climatology (~3 weeks)
  - Distinction between weather and climate and understanding of scale
  - Global energy budget
  - General circulation systems and models
  - Ocean circulation systems, sea surface temperatures, and continentality
  - Climate classification
- Ecodynamics (~3 weeks)
  - Vegetation systems as indicators of climate and microclimatic conditions
  - Biosphere-atmosphere interactions: gas exchanges, heat flux, water transfers
  - Phenology, land cover change, invasive species, succession, and climate change
- Climate change (~3 weeks)
  - Holocene climate and environmental change and palæoclimatic reconstruction
  - Biogeochemical cycles and anthropomorphic alterations of these
  - Urban heat island, air quality, and pollution
  - Frequency and magnitude relationships (*e.g.,* for floods, droughts, hurricanes)
  - Predicting climate trends and impacts over the next 100 – 1,000 years
  - GIS and remote sensing applications
  - Scientific uncertainty and the political manipulation of uncertainty

## VI Methods of Instruction:

A. Lectures will facilitate student learning of physical science content
B. Demonstration activities will facilitate student learning of physical science content
C. Discussions in the lecture and lab will facilitate student mastery of active science communication skills (oral communication, as well as quantitative reasoning and critical thinking).
D. Lab activities and problems and field activities and problems will facilitate student learning and application of quantitative reasoning and scientific communication skills. These will also give students practice in all the GE Intellectual and Practical Skills.
E. A required formal report will give students practice in all GE Intellectual and Practical Skills, sepecially the quantitative reasoning and scientific communication skills that dominate the Shared SLOs for this class
F. Exams will give students the opportunity to develop and demonstrate their mastery of all physical science content and skills (quantitative reasoning and scientific communication) SLOs emphasized in this class.

## VII Extent and Nature of the Use of Technology

Instructors may determine the specific mix of technology within certain constraints set by the nature of the course. Required elements include exposure to maps, remote sensing imagery, and spreadsheets for the calculation of statistics and linear equation modelling (*e.g.,* Excel). Optional elements include BeachBoard, campus web pages, search databases in the Library, viewgraph programs (*e.g.,* PowerPoint), microscopes, and the weather station.

## VIII Information about Textbooks and Readings:

A. **Textbook selection:** The choice of textbook for a course is the professional responsibility of the faculty members teaching the course. They will likely select one or more of the following, or similar:

1. Aguado, E. and Burt, J. 2006. *Understanding Weather and Climate,* 4$^{th}$ ed. Prentice Hall.
2. Ahrens, C. Donald. 2007. *Essentials of Meteorology,* Intl student ed. Brooks Cole.
3. Ahrens, C. Donald. 2008. *Meteorology Today: An Introduction to Weather, Climate, and the Environment,* 9$^{th}$ ed. Brooks Cole.
4. Bridgman, H.A. and Oliver, J.E. 2006. *The Global Climate System: Patterns, Processes, and Teleconnections.* Cambridge University Press.
5. Oliver, J.E. and Hidore, J.J. 2001. *Climatology: An Atmospheric Science,* 2$^{nd}$ ed. Prentice Hall
6. Rohli, R.V. and Vega, A.J. 2007. *Climatology.* and Barlett.

B. **Supplemental materials:** An important reference for students working their way through the material in GEOG 130 are lab materials provided as part of the class. In addition, there are several lab manuals that may be helpful to them as supplements or complements, which instructors may choose to require or recommend:

1. Carbone, G. 2006. *Exercises for Weather and Climate, 6th ed.* Prentice Hall.
2. Oklahoma Climatological Survey. 2005. *Explorations in Meteorology: A Lab Manual* . Brooks Cole.
3. Snow, R.; Snow, M.; and Oliver, J.E. 2002. *Exercises in Climatology.* Prentice Hall.
4. Lobban, C.S. and Schefter, M. 1992. *Successful Lab Reports: A Manual for Science Students*. Cambridge University Press.
5. McCaskill, M.K. 2008. *Grammar, Punctuation, and Capitalization: A Handbook for Technical Writers and Editors.* Hampton, VA: NASA Langley Research Center. Available at <http://www.sti.nasa.gov/sp7084/contents.html>.

C. **Departmental policy about content and level similarity in this multiple-section course:** While respecting individual faculty responsibility for textbook and other materials selection, the Department of Geography assures continuity in content and level through an *ad hoc* committee of faculty teaching the course, who meet at least once a year to compare syllabi and discuss particular textbooks

## IX Instructional Policies Requirements

Instructors may specify their own policies with regard to plagiarism, withdrawal, absences, etc., as long as the policies are consistent with the University policies published in the CSULB Catalog. It is expected that every course will follow University policies on Attendance (PS 01-01), Course Syllabi (PS 04-05), Final Course Grades, Grading Procedures, and Final Assessments (PS 05-07), and Withdrawals (PS 02-02 rev). All sections of the course will have a syllabus that includes the information required by the syllabus policy adopted by the Academic Senate. Instructors will include information on how students may make up work for excused absences and how participation is assessed. Syllabi must ask students to inform instructors promptly of the need for accommodation of disabilities. Instructors are asked to include statements about the nature of any online activities and resources and how participation in these activities is assessed.

## X Distance Learning/Hybrid Classes

GEOG 130, as a physical science lab class, is not suited for the distance learning format.

## XI Bibliography:

A. Textbooks:

Several are listed in VIII above. A brief selection of others at a more advanced level that an instructor may find useful as a reference for our students include:


1. Barry, R.G. and Carleton, A.M. 2001. *Synoptic and Dynamic Climatology.* Routledge.
2. Cracknell, A.P.; Krapivin, V.F.; and Vorotsos, C. 2008. *Global Climatology and Ecodynamics: Anthropogenic Changes to Planet Earth.* Springer Verlag.
3. McGuffie, K. and Henderson-Sellers, A. 1997. A Climate Modelling Primer, 2nd ed. Wiley.
4. Stull, Roland. 1999. *Meteorology for Scientists and Engineers*. Brooks Cole.
5. Wallace, John M. and Hobbs, Perry V. 2006. *Atmospheric Science: An Introductory Survey.* Academic Press.


B. Select journals in meteorology, climatology, ecodynamics, and climate change:


1. *Bulletin of the American Meteorological Society*
2. *Journal of Climate*
3. *Climatic Change*
4. *International Journal of Climatology*
5. *Journal of Hydrometeorology*
6. *Progress in Physical Geography*
7. *Physical Geography*
8. *EOS: Transactions of the American Geophysical Union*
9. *Journal of Geophysical Research*
10. *Geophysical Research Letters*
11. *Earth Interactions*
12. *Palæogeography, Palæoclimatology, Palæoecology*
13. *Journal of Quaternary Science*
14. *International Journal of Remote Sensing*
15. *Journal of Biogeography*
16. *Global Ecology and Biogeography*
17. *International Journal of Ecodynamics*
18. *Science*
19. *Nature Geoscience*
20. *Nature Climate Change* (will launch in October 2009)

**XII Student-Level Assessment :**

The exact balance of course assignments will vary depending on the instructor within the requirements below. University policy requires that no single evaluation of student achievement may count for more than one-third of final grade.

A. Exams (required, with no more than 50% of total exam points being of the passive-recognition type, such as true-false, multiple choice, or matching)
B. Essays on exams (required, with at least 25% of total exam points being based on essays of at least one paragraph in length, that is, not bullet-statement short answer question points)
C. Quantitative problems on exams (required, with at least 25% of total exam points being based on quantitative reasoning problems, whether essay, short answer, or passive choice)
D. Reports (at least one formal research report based on the quantitative analysis of data is required, and students will receive a basic rubric showing how the instructor evaluates content, quantitative reasoning, and writing mechanics)
E. Laboratory and field projects (required, and all must include quantitative reasoning and written material both textual and graphic)
F. Oral or poster presentations (optional)

**XIII Course-Level Assessment**

The Department of Geography has opted to participate in the SAGE Collaborative Track course assessment and recertification system for the evaluation of Shared Student Learning Outcomes in General Education. SAGE focusses on skills common to the GE curriculum, rather than content. The Department has elected to participate in the Quantitative Reasoning, Written Communication, and Creativity/Inquiry/Discovery skill assessment groups as most aligned with the dominant skill SLOs for this class. Attached please find a the SAGE Track Selection Form.

**XIV Consistency of SCO Standards across Sections**

At least once a year, faculty teaching the same class or faculty teaching the same type of course meet to discuss content and problems with the classes, learn about any University or College level changes that may require changes in the class, and work out the logistics of course-level assessment. Faculty share materials, putting syllabi in the Department's Curriculum file, putting rubrics on the Department's BeachBoard site, and collecting lab and other assignments in paper folders. The Chair and other tenured faculty make sure to mentor junior probationary and lecturer faculty about course SCOs and these collections of course-related materials to enculturate them to the Departmental norms for the class, including grading norms.

**XV Additional Resource for Development of Syllabi**

The Academic Senate has adopted a policy specifying required content for course syllabi. Instructors are encouraged to consult the Academic Senate web site for further information:
<http://www.csulb.edu/divisions/aa/grad_undergrad/senate/>