NEW COURSE FORM

Signature Routing Log

General Information:

Course Prefix and Number: GLY 155 (gen-ed)

Proposal Contact Person Name: Edward W Woolery Phone: 7-3016 Email: woolery@uky.edu

INSTRUCTIONS:

Identify the groups or individuals reviewing the proposal; note the date of approval; offer a contact person for each entry; and obtain signature of person authorized to report approval.

Internal College Approvals and Course Cross-listing Approvals:

Reviewing Group	Date Approved	Contact Person (name/phone/email)	Signature
Earth & Envirn. Sci., DUS	6/28/10	David Moecher / 7-6939 / moker@uky.edu	
Earth & Envirn. Sci., Chair	6/28/10	D. Ravat / 7-3758 / dhananjay.ravat@uky.edu	
		/ /	
A&S Ed. Policy Cmte.	11/2/10	G. Murthy / 7-4729 / ganpathy.murthy@uky.edu	
A&S Dean's Office	11/2/10	Anna Bosch / 7-6689 / bosch@uky.edu	

External-to-College Approvals:

11/5/10 sent to UGC

Council	Date Approved	Signature	Approval of Revision[6]
Undergraduate Council	9/20/2011	Sharon Gill	
Graduate Council			
Health Care Colleges Council			
Senate Council Approval		University Senate Approval	

Comments:

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[6] Councils use this space to indicate approval of revisions made subsequent to that council's approval, if deemed necessary by the revising council.

NEW COURSE FORM

1. General Information.

a. Submitted by the College of: Arts and Science Today's Date: 06/21/10,

b. Department/Division: Earth and Environmental Science

c. Contact person name: Edward W Woolery Email: woolery@uky.edu Phone: 7-3016

d. Requested Effective Date: ☐ Semester following approval OR ☒ Specific Term/Year[1]: Spring 2012

2. Designation and Description of Proposed Course.

a. Prefix and Number: GLY 155

b. Full Title: Earthquakes and Quantitative Reasoning

c. Transcript Title (if full title is more than 40 characters): Earthquakes and Quantitative Reasoning

d. To be Cross-Listed[2] with (Prefix and Number): N/A

e. Courses must be described by at least one of the meeting patterns below. Include number of actual contact hours[3] for each meeting pattern type.

2 Lecture _____ Laboratory[1] 1 Recitation _____ Discussion _____ Indep. Study

_____ Clinical _____ Colloquium _____ Practicum _____ Research _____ Residency

_____ Seminar _____ Studio _____ Other – Please explain: _____

f. Identify a grading system: ☒ Letter (A, B, C, etc.) ☐ Pass/Fail

g. Number of credits: 3

h. Is this course repeatable for additional credit? YES ☐ NO ☒

If YES: Maximum number of credit hours: _____

If YES: Will this course allow multiple registrations during the same semester? YES ☐ NO ☒

i. Course Description for Bulletin: Earthquake phenomena will be introduced in a manner that will allow students to learn why, where, and how earthquakes occur using elements of fundamental topics in algebra and trigonometry. These quantitative foundations will be used to investigate the origins and hazards associated with earthquakes, as well as their societal implications in both the United States and developing world. Students will often work in small groups to increase confidence in orally communicating their quantitative thinking and defending their logic, as well as providing an opportunity to consider alternative problem solving strategies.

j. Prerequisites, if any: none

k. Will this course also be offered through Distance Learning? YES[4] ☐ NO ☒

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[1] Courses are typically made effective for the semester following approval. No course will be made effective until all approvals are received.

[2] The chair of the cross-listing department must sign off on the Signature Routing Log.

[3] In general, undergraduate courses are developed on the principle that one semester hour of credit represents one hour of classroom meeting per week for a semester, exclusive of any laboratory meeting. Laboratory meeting, generally, represents at least two hours per week for a semester for one credit hour. (from *SR 5.2.1*)

[4] You must *also* submit the Distance Learning Form in order for the proposed course to be considered for DL delivery.

NEW COURSE FORM

l. Supplementary teaching component, if any: ☐ Community-Based Experience ☐ Service Learning ☐ Both

3. **Will this course be taught off campus?** YES ☐ NO ☒

4. **Frequency of Course Offering.**

a. Course will be offered (check all that apply): ☒ Fall ☒ Spring ☒ Summer

b. Will the course be offered every year? YES ☒ NO ☐

If NO, explain: _____

5. **Are facilities and personnel necessary for the proposed new course available?** YES ☒ NO ☐

If NO, explain: _____

6. **What enrollment (per section per semester) may reasonably be expected?** 100

7. **Anticipated Student Demand.**

a. Will this course serve students primarily within the degree program? YES ☐ NO ☒

b. Will it be of interest to a significant number of students outside the degree pgm? YES ☒ NO ☐

If YES, explain: Previous similar course has been very popular with non-majors.

8. **Check the category most applicable to this course:**

☐ Traditional – Offered in Corresponding Departments at Universities Elsewhere

☐ Relatively New – Now Being Widely Established

☒ Not Yet Found in Many (or Any) Other Universities

9. **Course Relationship to Program(s).**

a. Is this course part of a proposed new program? YES ☒ NO ☐

If YES, name the proposed new program: This new class is a potential selection of the new General Education curriculum.

b. Will this course be a new requirement[5] for ANY program? YES ☐ NO ☒

If YES[5], list affected programs: _____

10. **Information to be Placed on Syllabus.**

a. Is the course 400G or 500? YES ☐ NO ☒

If YES, the *differentiation for undergraduate and graduate students must be included* in the information required in ***10.b***. You must include: (i) identification of additional assignments by the graduate students; and/or (ii) establishment of different grading criteria in the course for graduate students. (See *SR 3.1.4.*)

b. ☐ The syllabus, including course description, student learning outcomes, and grading policies (and 400G-/500-level grading differentiation if applicable, from ***10.a*** above) are attached.

[5] In order to change a program, a program change form must also be submitted.

University Senate Syllabi Guidelines

6h 4/55 new crs gen ed

General Course Information

- ☑ Full and accurate title of the course.
- ☑ Departmental and college prefix.
- ☑ Course prefix, number and section number.
- ☑ Scheduled meeting day(s), time and place.

Instructor Contact Information (if specific details are unknown, "TBA" is acceptable for one or more fields)

- ☑ Instructor name.
- ☑ Contact information for teaching/graduate assistant, etc.
- ☑ Preferred method for reaching instructor.
- ☑ Office phone number.
- ☑ Office address.
- ☑ UK email address.
- ☑ Times of regularly scheduled office hours and if prior appointment is required.

Course Description

- ☑ Reasonably detailed overview of the course.
- ☑ Student learning outcomes.
- ☑ Course goals/objectives.
- ☑ Required materials (textbook, lab materials, etc.).
- ☑ Outline of the content, which must conform to the Bulletin description.
- ☑ Summary description of the components that contribute to the determination of course grade.
- ☑ Tentative course schedule that clarifies topics, specifies assignment due dates, examination date(s).
- ☑ Final examination information: date, time, duration and location.
- ☑ For 100-, 200-, 300-, 400-, 400G- and 500-level courses, numerical grading scale and relationship to letter grades for *undergraduate* students.
- n/a ☐ For 400G-, 500-, 600- and 700-level courses, numerical grading scale and relationship to letter grades for *graduate* students. (Graduate students cannot receive a "D" grade.)
- ☑ Relative value given to each activity in the calculation of course grades (Midterm=30%; Term Project=20%, etc.).
- mid ☑ Note that undergraduate students will be provided with a Midterm Evaluation (by the midterm date) of course performance based on criteria in syllabus.
- ☑ Policy on academic accommodations due to disability. Standard language is below:

  If you have a documented disability that requires academic accommodations, please see me as soon as possible during scheduled office hours. In order to receive accommodations in this course, you must provide me with a Letter of Accommodation from the Disability Resource Center (Room 2, Alumni Gym, 257-2754, email address jkarnes@email.uky.edu) for coordination of campus disability services available to students with disabilities.

Course Policies

- ☑ Attendance.
- ☑ Excused absences.
- ☑ Make-up opportunities.
- ☑ Verification of absences.
- ☑ Submission of assignments.
- ☑ Academic integrity, cheating & plagiarism.
- ☑ Classroom behavior, decorum and civility.
- n/a ☐ Professional preparations.
- n/a ☐ Group work & student collaboration.

General Education Course Submission Form **Date of Submission:** 06/21/10

1. Check which area(s) this course applies to.

Inquiry – Arts & Creativity	☐	Composition & Communications - II	☐
Inquiry – Humanities	☐	Quant Reasoning – Math	X
Inquiry – Nat/Math/Phys Sci	☐	Quant Reasoning – Stat	☐
Inquiry – Social Sciences	☐	Citizenship – USA	☐
Composition & Communications - I	☐	Citizenship - Global	☐

2. Provide Course and Department Information.

Department: Earth and Environmental Sciences

Course Prefix and Number: GLY155 Credit hours: 3

Course Title: Earthquakes and Quantitative Reasoning

Expected Number of Students per Section: 100 Course Required for Majors in your Program? No

Prerequisite(s) for Course? none

This request is for (check one): A New Course [X] An Existing Course [ ]

Departmental Contact Information

Name: Edward W. Woolery Email: woolery@uky.edu

Office Address: 309 Slone Building Phone: 7-3016

3. In addition to this form, the following must be submitted for consideration:

- A syllabus that conforms to the Senate Syllabi Guidelines, including listing of the Course Template Student Learning Outcomes.
- A narrative (2-3 pages max) that explains: 1) how the course will address the General Education and Course Template Learning outcomes; and 2) a description of the type(s) of course assignment(s) that could be used for Gen Ed assessment.
- If applicable, a major course change form for revision of an existing course, or a new course form for a new course.

4. Signatures

Department Chair: Dhananjay Ravat Digitally signed by Dhananjay Ravat DN: cn=Dhananjay Ravat, o=University of Kentucky, ou=DEES, email=dhananjay.ravat@uky.edu, c=US Date: 2010.06.25 15:09:40 -04'00' Date:

Dean: ARBosch Date: 6/25/10

College Deans: Submit all approved proposals electronically to:
Sharon Gill Sharon.Gill@uky.edu
Office of Undergraduate Education

Revised May 6, 2010

GLY 155: Earthquakes and Quantitative Reasoning

Dept. of Earth and Environmental Sciences, University of Kentucky
Fall Semester, 2012: 3 Credit Hours
Course Website — http://www.uky.edu/AS/Geology/woolery/155/

Syllabus

INSTRUCTOR: Dr. Edward W. Woolery
Associate Professor
Office: 309 Slone Building
Phone: 257-3016
E-mail: woolery@uky.edu
Office Hours: Tuesday, 1400–1500 hrs, Wednesday 1400–1500 hrs, or by appointment

TEACHING ASSISTANT: Jane Doe
Office: 209 Slone Building
E-mail: jane.doe@uky.edu
Office Hours: Tuesday, 0900–1100 HRS

LECTURES: MWF 0900–0950 HRS, 303 Slone Building

CLASS SCHEDULE: See attached schedule

TEXTBOOK: Bolt, B., *Earthquakes*, 5th edition, W.H. Freeman, N.Y., 2006.

COURSE DESCRIPTION AND OBJECTIVES:

Earthquake phenomena will be introduced in a manner that will allow students to learn why, where, and how earthquakes occur using elements of fundamental topics in algebra and trigonometry. These quantitative foundations will be used to investigate the origins and hazards associated with earthquakes, as well as their societal implications in both the United States and developing world. Students will often work in small groups to increase confidence in orally communicating their quantitative thinking and defending their logic, as well as providing an opportunity to consider alternative problem solving strategies.

STUDENT LEARNING OUTCOMES:

1) Demonstrate proficiency with number sense and functional relationships, and understand various representations of these relationships by examining elementary, but fundamental mathematical topics that can include:
    a. *Basics:* graphing, unit conversion, dimensional analysis, estimation, substitution of variables, solving systems of equations
    b. *Functions:* dependent and independent variables, separation of variables, types of functions (linear, power, exponential, logarithmic), periodic functions
    c. *Multi-variable Analysis:* trigonometry, vectors, slope, matrices, linear algebra, complex numbers, sensitivity analysis

2) Apply fundamental elements of mathematical knowledge to solve and model real-life problems in elementary earthquake seismology. These problems can include:
    a. *Quantifying* the causes and occurrences of earthquakes
    b. *Quantifying* what we feel in an earthquake

c. *Quantifying* earthquake magnitudes
d. *Quantifying* seismic wave propagation and the exploration of the Earth's interior
e. *Interpreting* quantitative data
f. *Identifying* and *evaluating* erroneous reasoning
g. *Identifying* and *evaluating* the limitations of particular models

ASSIGNMENTS AND GRADING:

- *Overall grade components*: 50% exams and 50% earthquake homework assignments

- *Overall grading*: 90 and above = A, 80-89 = B, 70-79 = C, 60-69 = D, below 60 = E. Grades **may be**, but NOT necessarily, adjusted if the need arises.

- *Exams* (Remember: **BRING #2 PENCILS, CALCULATOR, AND RULER TO EXAMS**):
  Exam #1: Wednesday, 29 September (15% of class grade)
  Exam #2: Friday, 12 November (15% of class grade)
  Exam #3 (FINAL): Wednesday, 15 December, 1030 HRS (20% of class grade)

  Each exam may include multiple choice, matching, true/false questions, and/or short answer problem-solving questions. The final exam ***will be*** course comprehensive. More details will be provided before each exam.

  All material covered in lecture and homework assignments should be reviewed in preparation for the exams. Material from reading assignments in the text that was not covered in lecture or homework will not appear on the exam. Lecture notes will be related to the textbook, but supplemental handout material not in the textbook will also be discussed in class.

- *Homework Assignments*: There will be approximately 5 homework assignments given periodically during the semester. Some assignments will be performed in class, and will be due at the end of class; however, outside homework will be due one (1) week subsequent to assignment (see class schedule for tentative dates). In the final grade calculation, each homework assignment will be weighted equally. Reports for "group assignments" will list the names of all group members and include a brief explanation of each member's involvement. Any writing assignments must be typed, clearly written, and properly referenced. All calculations, graphs, and other quantitative short answers may be completed by hand, but presented in a clear, logical, and step-by-step manner; otherwise no partial credit.

OTHER COURSE POLICIES

- *Lectures*: Lectures will be given primarily in PowerPoint. If it helps to convey meaning, various diagrams may also be drawn on the board to supplement the PowerPoint notes. If required, you can also view the detailed PowerPoint slides (text + figures) during TA office hours.

- *Absences*: Note that the following are acceptable reasons for excused absences under University of Kentucky Senate Rules (S.R.): 1) serious illness; 2) illness or death of family member; 3) University-related trips (S.R. 5.2.4.2.C); 4) major religious holidays; 5) other circumstances that the instructor finds to be "reasonable cause for nonattendance." Detailed rule explanations are at *http://www.uky.edu/Ombud/policies.php* and *http://www.uky.edu/StudentAffairs/Code/part2.html*. The burden of proof for verification of an excused absence is on the student, and the instructor retains the right to ask for sufficient documentation. It is preferable to notify the instructor in advance of any planned absences. If you do not notify the instructor prior to your absence, you must do so within one week (S.R. 5.2.4.2.D). When there is an excused absence, the student will be given the opportunity to make up missed work and/or exams. No opportunity will be given the opportunity to make up missed work and/or exams in the event of an unexcused absence.

- *Cheating and Plagiarism*: In the unlikely event that an occurrence of cheating or plagiarism occurs, it will be dealt with according to *http://www.uky.edu/USC/New/rules_regulations/index.htm*.
- *Academic Accommodations due to disability:* If you have a documented disability that requires academic accommodations, please see me as soon as possible during scheduled office hours. In order to receive accommodations in this course, you must provide me with a Letter of Accommodation from the Disability Resource Center (Room 2, Alumni Gym, 257-2754, email address jkarnes@eamil.uky.edu) for coordination of campus disability services available to students with disabilities.

- *Course Policy on Classroom civility and decorum:* The university, college and department have a commitment to respect the dignity of all and to value differences among members of our academic community. There exists the role of discussion and debate in academic discovery and the right of all to respectfully disagree from time-to-time. Students clearly have the right to take reasoned exception and to voice opinions contrary to those offered by the instructor and/or other students (S.R. 6.1.2). Equally, a faculty member has the right -- and the responsibility -- to ensure that all academic discourse occurs in a context characterized by respect and civility. Obviously, the accepted level of civility would not include attacks of a personal nature or statements denigrating another on the basis of race, sex, religion, sexual orientation, age, national/regional origin or other such irrelevant factors.

KEYS TO PERFORMING WELL IN GLY 155:

1. Read chapters before class and review your notes. Your comprehension of the material will be better if you read the assigned sections in the textbook and any handouts before class.
2. Come to class on time and stay for the entire period. If you have to leave early, please let me know at the beginning of class. You may not get up during the lecture and leave unless you have cleared it with me prior to class. Early departures are very disruptive to the class.
3. Pay attention and ask questions (in lecture, during office hours [mine and your TA's], via e-mail).
4. Take good notes.
5. Know what the terms mean. Every science has a vocabulary and while we'll try to keep the terms to a minimum, you need to speak the language to some extent.
6. Find someone to study with who is committed to doing well.
7. Read or listen to the news.
8. If you are at all concerned about how the course is going, see me immediately.

Tentative **GLY155 Course Schedule**

Meeting#	Day	Date	Lecture/Recitation Topic	Text Location/Homework
1	Wed.	Aug. 25	Course Introduction & Earthquakes and Volcanoes Overview	-
2	Fri.	Aug. 27	**Recitation:** Quantitative Tools for Tectonic Paradigm	Chap. 7
3	Mon.	Aug. 30	Quantitative Tools for Tectonic Paradigm	Chap. 7
4	Wed.	Sept. 01	Quantitative Tools for Tectonic Paradigm	Chap. 7
5	Fri.	Sept. 03	**Recitation**: Tectonic Paradigm	Chap. 7

Meeting#	Day	Date	Lecture/Recitation Topic	Text Location/Homework
********	Mon.	Sept. 06	**NO CLASS – Labor Day Hol.**	**********
6	Wed.	Sept. 08	Tectonic Paradigm	Chap. 7
7	Fri.	Sept. 10	**Recitation:** Tectonic Paradigm – Group Activity	HW #1
8	Mon.	Sept. 13	Quantitative Tools for Earthquake Faults	Chap. 3
9	Wed.	Sept. 15	Quantitative Tools for Earthquake Faults	Chap. 3
10	Fri.	Sept. 17	**Recitation:** Quantitative Tools for Earthquake Faults	Chap. 3
11	Mon.	Sept. 20	Earthquake Faults	Chap. 3
12	Wed.	Sept. 22	Earthquake Faults	Chap. 3
13	Fri.	Sept. 24	**Recitation:** Earthquake Faults – Group Activity	HW #2
14	Mon	Sept. 27	Concepts Review	-
5	Wed.	Sept. 29	**Exam #1 (Lectures 1-14)**	-
16	Fri.	Oct. 01	**Recitation:** Quantitative Tools for Seismic Waves I	Chap. 1
17	Mon.	Oct. 04	Quantitative Tools for Seismic Waves I	Chap. 1
18	Wed.	Oct. 06	Quantitative Tools for Seismic Waves I	Chap. 1
19	Fri.	Oct. 08	**Recitation:** Quantitative Tools for Seismic Waves I	Chap. 1
20	Mon.	Oct. 11	Seismic Waves I	Chap. 1
21	Wed.	Oct. 13	Seismic Waves I	Chap. 1
22	Fri.	Oct. 15	**Recitation:** Seismic Waves I – Group Activity	HW #3
23	Mon.	Oct. 18	Quantitative Tools for Seismic Waves II	Chap. 1
24	Wed.	Oct. 20	Quantitative Tools for Seismic Waves II	Chap. 1
25	Fri.	Oct. 22	**Recitation:** Quantitative Tools for Seismic Waves II	Chap. 1
26	Mon.	Oct. 25	Seismic Waves II	Chap. 1
27	Wed.	Oct. 27	Seismic Waves II	Chap. 1
28	Fri.	Oct. 29	**Recitation:** Seismic Waves II – Group Activity	HW #4
29	Mon.	Nov. 01	Quantitative Tools for Measuring Earthquakes	Chap. 5
30	Wed.	Nov. 03	Quantitative Tools for Measuring Earthquakes	Chap. 5
31	Fri.	Nov. 05	**Recitation:** Measuring Earthquakes	Chap. 5

Meeting#	Day	Date	Lecture/Recitation Topic	Text Location/Homework
32	Mon.	Nov. 08	Measuring Earthquakes	Chap. 5
33	Wed.	Nov. 10	Concepts Review	-
34	Fri.	Nov. 12	**Exam #2 (Lectures 16-33)**	
35	Mon.	Nov. 15	Quantitative Tools for Earthquake Size	Chap. 8
36	Wed.	Nov. 17	Quantitative Tools for Earthquake Size	Chap. 8
37	Fri.	Nov. 19	**Recitation:** Quantitative Tools for Earthquake Size	Chap. 8
38	Mon.	Nov. 22	Earthquake Size	Chap. 8
39	Wed.	Nov. 24	Earthquake Size	Chap. 8
********	Fri.	Nov. 26	**NO CLASS – Thanksgiving Holiday**	-
40	Mon.	Nov. 29	Quantitative Tools for Earthquake Hazard/Risk	Chap. 11-12
41	Wed.	Dec. 01	Quantitative Tools for Earthquake Hazard/Risk	Chap. 11-12
42	Fri.	Dec. 03	**Recitation:** Earthquake Size – Group Activity	HW #5
43	Mon.	Dec. 06	Earthquake Hazard/Risk	Chap. 11-12
44	Wed.	Dec. 08	Earthquake Hazard/Risk	Chap. 11-12
45	Fri.	Dec. 10	**Recitation:** Concepts Review	-
46	Wed.	Dec. 15	**Final Exam (Lectures 1 – 45)**	-

Learning Outcomes: *GLY155 – Earthquakes and Quantitative Reasoning*

A. Addressing the Learning Outcomes of One of the Four Areas of GenEd

The Quantitative Foundations section of the Quantitative Reasoning Area of General Education stipulates that students in these courses utilize elements of mathematics, statistics, and logic to investigate the causes and effects associated with scientific phenomena, as well as their societal implications and relevance. The general Quantitative Foundations learning outcomes are defined through activities that expect the student to:

1) Demonstrate proficiency with number sense, functional relationships, and understand various representations of these relationships.
2) Apply quantitative concepts to model and solve real-life problems. This includes the use of critical thinking skills to extract, evaluate and validate information as well as organize, communicate and accurately use information in tangible and meaningful ways.

B. Specifically Addressing the Quantitative Foundations Template

The proposed course, titled, "GLY155 – Earthquakes and Quantitative Reasoning," will provide an excellent vehicle for conforming to these two primary learning outcomes. Specifically, the proposed course will:

1) (30%) Demonstrate proficiency with number sense and functional relationships, and understand various representations of these relationships by examining elementary, but fundamental mathematical topics that can include:
    a. *Basics:* graphing, unit conversion, dimensional analysis, estimation, substitution of variables, solving systems of equations
    b. *Functions:* dependent and independent variables, separation of variables, types of functions (linear, power, exponential, logarithmic), periodic functions

c. *Multi-variable Analysis:* trigonometry, vectors, slope, matrices, linear algebra, complex numbers, sensitivity analysis

2) (40%) Apply fundamental elements of mathematical knowledge to solve and model real-life problems in elementary earthquake seismology. These problems can include:
   a. *Quantifying* the causes and occurrences of earthquakes
   b. *Quantifying* what we feel in an earthquake
   c. *Quantifying* earthquake magnitudes
   d. *Quantifying* seismic wave propagation and the exploration of the Earth's interior
   e. *Interpreting* quantitative data
   f. *Identifying* and *evaluating* erroneous reasoning
   g. *Identifying* and *evaluating* the limitations of particular models

C. Active Engagement of Student in Course

The course outcomes will be accomplished through independent and collaborative homework assignments. Independent homework assignments will generally include background reading for earthquake topic being discussed, but can include additional quantitative practice problems if it becomes evident that in-class collaborative group activities require additional reinforcement of the quantitative foundations. Questions relating the reading assignments to the lectures and group activities will be part of the submitted homework report. Collaborative group activities during recitation will emphasize quantitative problem solving and the physical or real interpretation of the solution(s). Specifically, the activities will be designed to build student confidence in quantitative foundations that include data interpretation, identifying erroneous reasoning, evaluating model limitations, as well as reinforcement of fundamental elements of algebra and trigonometry. Below is an example group activity for "Seismic Waves I" that was modified from http://serc.carleton.edu/quantskills/activities/interior_seismic.html: