

## COMPLETELY ONLINE WEATHER COURSES AT CSUN

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### 1. INTRODUCTION

At California State University, Northridge, the online teaching program began in fall 1999 with 8 GE courses offered. In order to encourage faculty members to be engaged in GE online courses, the university IT team offered webct workshops every semester. More than 600 faculty members have attended the workshops during the past five years. Each workshop covers the topics of creating Homepage, Image Database, Content Modules, Quiz, Bulletinboard, and Chatroom using WebCT software. The software programs such as photoshop, power point, and dreamweaver were also offered to enhance the instructor's ability to manipulate various kinds of files and to create a webpage. The university provided an incentive program awarding faculty members who teach a GE online course the first time with \$2,000. Some college deans considered online teaching as a significant criterion in favor of merit salary increase. Some department chairs offered 3-unit release time to online teaching participants. The purpose of the university's online teaching policy is to accelerate the rate of graduation for undergraduate students.

The author began to teach a completely online atmosphere course (Geography 311) in fall 2003 using WebCT program to create a Homepage that includes all materials used for the regular classes taught in the past. Meanwhile, the geography department obtained the AMS online weather studies license. In Spring 2004, The author began to teach a partially online weather class (Geography 103). The lecture was delivered in the classroom while the examinations were conducted online. Online Weather Studies and Study Guide were adopted as course textbooks. Students were requested to complete some of the exercises in the Study Guide as classroom and home works. Photoshop software was used to edit weather maps and stuve diagram obtained from the website of the AMS Online Weather Studies. So far, the author has developed 4 completely online courses: weather, atmosphere, air pollution, and boundary-layer climatology. Weather course fulfills lower-division GE requirement. Atmosphere course fulfills upper-division GE requirement. Air pollution and boundary-layer climatology meet the major's requirement. The CSUN

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offers 66 online classes in fall 2005. Four of them are weather and atmosphere online classes. The enrollment of the online classes increased significantly as compared to the regular classroom classes the author taught before. All GE classes that the author offered reached full enrollment within a few days of the opening of registration. The overall student performance in the online classes is about the same as the regular classes, judging from the class grade distribution curves.

### 2. HOMEPAGE

The first step to conduct an online weather course is to create a Homepage in the course website established by the CSUN IT team (Figure 1). There are view and designer options in the Homepage. The instructor uses the designer option to customize his Homepage format. He uses WebCT tools to link the subject files of his interest to the Homepage represented by the icons on the central column and also listed under the Course Menu on the left column (Figure 2). The tool used to create link icons and Course Menu is accessed from "Add page or tool" option on the right column and/or from the Control Panel above the Course Menu in the Homepage. The right column provides options to create and edit links and textblocks in the Homepage. The textblocks refer to the icons above and below the link icons on the central column of the Homepage. The subjects of the course content and the course requirement are placed in the upper and the lower textblocks respectively. The View option provides the student view of the Homepage. The right column in the designer option is absent from the student-view Homepage (Figure 3). The word "myWebCT" on the topbar is used to navigate from one course to the next taught by the instructor.

The author relies on mainly five webCT tools to develop his online weather courses. These are Content Modules, Image Database, Quiz, Discussion (Bulletinboard named by the author), and My Grades. The other subjects of interest such as course syllabus, term paper requirement, the links of AMS Online Weather Studies and the other universities or Colleges (UIUC and Plymouth), weather loops, antivirus software, and a North America topographic map (Home icon) are placed in the Homepage too. Some animation icons are used to promote the visual effect.

The image shows a screenshot of a web browser window titled "WebCT Course Creation Form - Microsoft Internet Explorer". The address bar shows the URL "https://webteach.csun.edu/createWebCTcourse.html". The page content includes the California State University Northridge logo and the title "WebCT Course Creation Form". Below the title, there is a paragraph of text explaining the form's purpose for instructors. A central form box contains input fields for "CSUN E-mail Address", "Password", "Term" (set to "Fall 2005"), and "Ticket\*", along with a "Continue" button. A note below the form states that entering a ticket number is required only if the course is taught by staff. At the bottom, there is a link to the CSUN Office of Online Instruction and the email address "webteach@csun.edu".

WebCT Course Creation Form - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address <https://webteach.csun.edu/createWebCTcourse.html> Go My Search More

## California State University Northridge WebCT Course Creation Form

CSUN instructors may use this form to create their own account and courses on the CSUN WebCT system. Once a course is created, student WebCT accounts are automatically created (where necessary) and enrolled into the class at a date specified by the instructor. Periodic processes ensure that the WebCT course roster matches the SOLAR records for the class. Students will log in to WebCT with their CSUN e-mail address and corresponding password in order to access the course.

CSUN E-mail Address:

Password:

Term: Fall 2005

Ticket\*:

\* Entering a ticket number is required only if the course is listed as being taught by "staff" in the course catalog.

Use of this form requires an active CSUN e-mail address, which can be obtained via the [CSUN Campus Account Utility page](#).

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[CSUN Office of Online Instruction](#)

[webteach@csun.edu](mailto:webteach@csun.edu)

Done Internet

FIG. 1 Online course creation form.

The screenshot displays a WebCT instructor interface for a course titled "GEOG3110L The Atmosphere (14982 - Fa05)". The browser window is Microsoft Internet Explorer, showing the URL [https://webteach.csun.edu:31987/SCRIPT/GEOG3110L\\_14982-Lin-Fa05/scripts/serve\\_home](https://webteach.csun.edu:31987/SCRIPT/GEOG3110L_14982-Lin-Fa05/scripts/serve_home). The page is titled "Online Atmosphere (Geography 311, #14982), Fall 2005".

The interface includes a "Control Panel" with "View" and "Designer Options" tabs. A "Course Menu" is visible on the left, listing items such as "Homepage", "AMS Online Weather Studi...", "Antivirus", "bulletinboard", "\*Content Modules", "Course syllabus", "Happy New Year (The year...", "\*Image Database", "My Grades", "\*Quiz", "Quiz Submission for (WebCT Course Navigation)", "Term Paper (due on Decem...", "Term paper example", "Topography(USA, for your...", "Tutor available (Sierra ...", "UIUC and Plymouth Webst...", and "Weather Loops".

The main content area features a map titled "SST ANOMALIES °C FEB 10, 1983" showing a strong positive anomaly in the central Pacific. Below the map is a section titled "El Nino Southern Oscillation" with the text: "Clouds and Precipitation, Weather Maps, Satellite photos, Radar Images, Atmospheric circulation, ENSO, MJO, Santa Ana Wind, Weather Forecast (NWP, MOS), Ozone Hole, LA Smog, and Climatic Change." Below this text are three image thumbnails: a satellite image of a cloud, a sun behind a cloud, and a globe with a keyboard. The text "Term Paper (due on December 1," is visible below the third thumbnail.

On the right side, there is a "Actions" panel with various options: "Add page or tool", "Edit", "Delete", "Hide", "Reveal", "Specify selective release", "Move backward", "Move forward", "Move to organizer page", "Move to Course Menu", and "Copy to Course Menu". Below this is a "Textblocks" section with "Add upper textblock", "Add lower textblock", "Edit", "Delete", "Move up", and "Move down". At the bottom right, there is a "Customize" section with "Modify layout" and "Customize page colors".

FIG. 2. Instructor view of homepage (designer option).

The screenshot shows a WebCT interface for a course titled "GEOG3110L The Atmosphere (14982 - Fa05)". The browser window is Microsoft Internet Explorer. The address bar shows the URL: [https://webteach.csun.edu:31987/SCRIPT/GEOG3110L\\_14982-Lin-Fa05/scripts/serve\\_home](https://webteach.csun.edu:31987/SCRIPT/GEOG3110L_14982-Lin-Fa05/scripts/serve_home). The page content includes a "Control Panel" with "View" and "Designer Options" tabs. A "Course Menu" is visible on the left, listing items like "Homepage", "AMS Online Weather Studi...", "Antivirus", "bulletinboard", "\*Content Modules", "Course syllabus", "Happy New Year (The year...", "\*Image Database", "My Grades", "\*Quiz", "Quiz Submission for Grad...", "Study Instruction", "Term Paper (due on Decem...", "Term paper example", "Topography(USA, for your...", "Tutor available (Sierra ...", "UIUC and Plymouth Webst...", and "Weather Loops". The main content area has a green background and features a central map titled "SST ANOMALIES °C FEB 03, 1983". The map shows a color scale from -5 to 5, with a prominent red area in the central Pacific. Below the map is the text "El Nino Southern Oscillation" and a list of topics: "Clouds and Precipitation, Weather Maps, Satellite photos, Radar Images, Atmospheric circulation, ENSO, MJO, Santa Ana Wind, Weather Forecast (NWP, MOS), Ozone Hole, LA Smog, and Climatic Change." At the bottom, there is a grid of six content modules: "Study Instruction" (with a photo of an astronaut), "Course Syllabus" (with a cloud icon), "Term Paper (due on December 1, 2005)" (with a laptop icon), "Term paper example" (with a person at a computer icon), "\*Content Modules" (with a globe icon), and "Image Database" (with a camera icon).

FIG. 3. Student view of homepage (view option).

### 3. CONTENT MODULES

All quiz materials are placed in the three tools; Content Modules, Image Database, and Quiz. A course content normally consists of texts and figures (weather maps, radar images, satellite photos, graphs, and tables). The hard copies of figures are scanned as image files (jpg files) and are placed in the Image Database. The Content Modules provide the links to the

files of the text part of the course contents including the lecture notes and quiz study guides (figure 4). The figures may be inserted to the files of course text content as Microsoft word files and uploaded to the Content Modules as pdf or webpage (html) files. The lecture notes can be also accessed from the author's lecture-note website URL in the course syllabus. Links to the weather information and video in the weather-related websites are also created in the Content Modules.

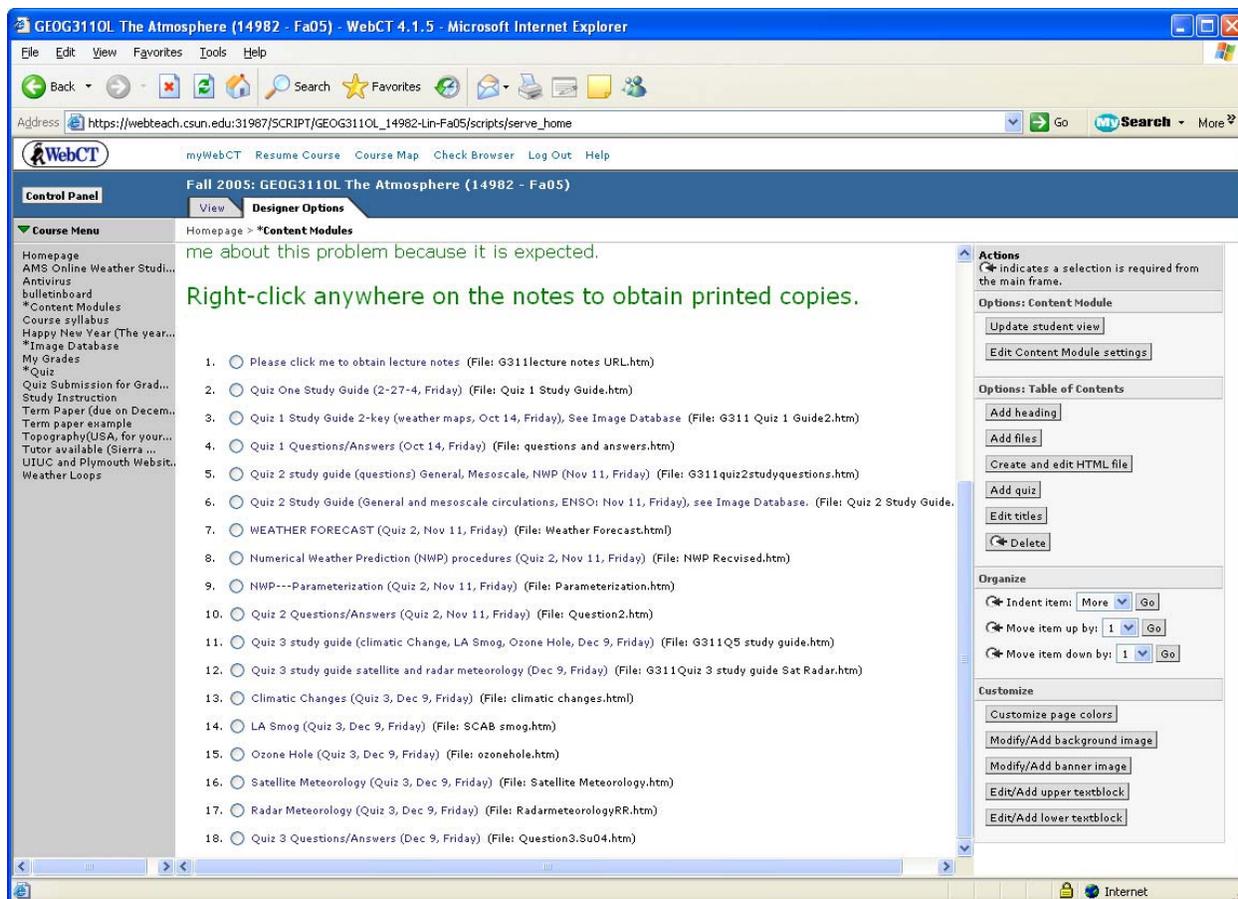


FIG. 4. Content Modules.

#### 4. IMAGE DATABASE

Content module contains lecture notes and quiz study guides with the links of interested weather websites and video files. Image database covers figures (image files) for quizzes. Since the course grades are based on the class rankings of the total scores of the three quizzes students have earned, the figures in the Image Database are grouped into three databases; quiz 1, quiz 2, and quiz 3 (Figure 5). The thumbnail icons of figures along with the associated information are accessed by opening those three image database groups (Figure 6). Unlike Homepage and Content Modules where commands are available to navigate the links (icons) and items up and down, the figures in the image database have to be labeled in numerical and/or alphabetical order because commands are not available to shift figure order up and down. Individual figures along with captions can be accessed by opening the thumbnail icons. The figures have to be scaled to a single-page size for the convenience of reading and printing (Figure 7). Notes

and arrows explaining particular features in the figures are added by employing the photoshop skill. The caption space is large enough to place figure information in a great detail.

The workshop of AMS Online Weather Studies the author attended on May 16-21 2004 provided an excellent opportunity to enhance the author's knowledge of using various products from NWS for online course presentations. In contrast to the contemporary weather textbooks, the author's online weather and atmosphere courses contain image databases that use real weather maps and stuve diagram so that students would not feel out of the touch with the reality. The NCEP products, satellite photos, and radar imageries presented by the leaders of the NWS during the workshop provided invaluable sources of online teaching materials. The subjects on numerical weather prediction as well as satellite and radar interpretations learned from the workshop were incorporated into the author's online courses in the Content Modules, Image Database, and Quiz.

GEOG3110L The Atmosphere (14982 - Fa05) - WebCT 4.1.5 - Microsoft Internet Explorer

Address: https://webteach.csun.edu:31987/SCRIPT/GEOG3110L\_14982-Lin-Fa05/scripts/serve\_home

Control Panel: View Designer Options

Fall 2005: GEOG3110L The Atmosphere (14982 - Fa05)

Course Menu: Homepage > \*Image Database

Image Database

Available databases:

- 1. 1st exam figures (Quiz 1)
- 2. 2nd examination Figures (Quiz 2)
- 3. Final exam figures (Quiz 3)

Actions: Indicates a selection is required from the main frame.

Options:

- Add image database
- Edit
- Rename
- Delete

FIG. 5. The three groups of Image Database.

GEOG3110L The Atmosphere (14982 - Fa05) - WebCT 4.1.5 - Microsoft Internet Explorer

Address: https://webteach.csun.edu:31987/SCRIPT/GEOG3110L\_14982-Lin-Fa05/scripts/serve\_home

Control Panel: View Designer Options

Fall 2005: GEOG3110L The Atmosphere (14982 - Fa05)

Course Menu: Homepage > \*Image Database > Final exam figures (Quiz 3)

Image Database: Final exam figures (Quiz 3)

Actions: Indicates a selection is required from the main frame.

Options: Add image, Edit, Delete, Search, Show all, Manage columns

<input type="radio"/>	1. YCP (Volume Coverage Pattern), radar beam angle (elevation)	NWS	radar beam angles copy.jpg	Precipitation Volume Coverage Pattern (VCP)	<a href="#">View description</a>
<input type="radio"/>	2. Bow echo, downburst, San Joaquin	---	severestorm 036 copy.jpg	Bow echo in San Joaquin and Stockton	<a href="#">View description</a>
<input type="radio"/>	3. Bow Echo 1, comma echo	NWS	figure1.jpg	Bow Echo 1, comma echo	<a href="#">View description</a>
<input type="radio"/>	4. Bow echo 2, comma echo	NWS	bowecho2	Bow echo 2, comma echo	<a href="#">View description</a>
<input type="radio"/>	5. BWER, WER	NWS	BWER.gif	BWER (Bounded Weak Echo Region)	<a href="#">View description</a>
<input type="radio"/>	6. Cold front	NWS	coldrontrain copy.jpg	Cold front on Reflectivity and Radial Velocity images	<a href="#">View description</a>
<input type="radio"/>	7. Cold front, dry line	NWS	reflectivity copy.jpg	Cold front on Reflectivity Radar Image	<a href="#">View description</a>
<input type="radio"/>	8. Cross Section of Reflectivity	NWS	Copy of reflectivity cross-section copy.jpg	Cross section of Reflectivity	<a href="#">View description</a>

List: 44 record(s)

FIG. 6. Figures in the final examination (Quiz 3).

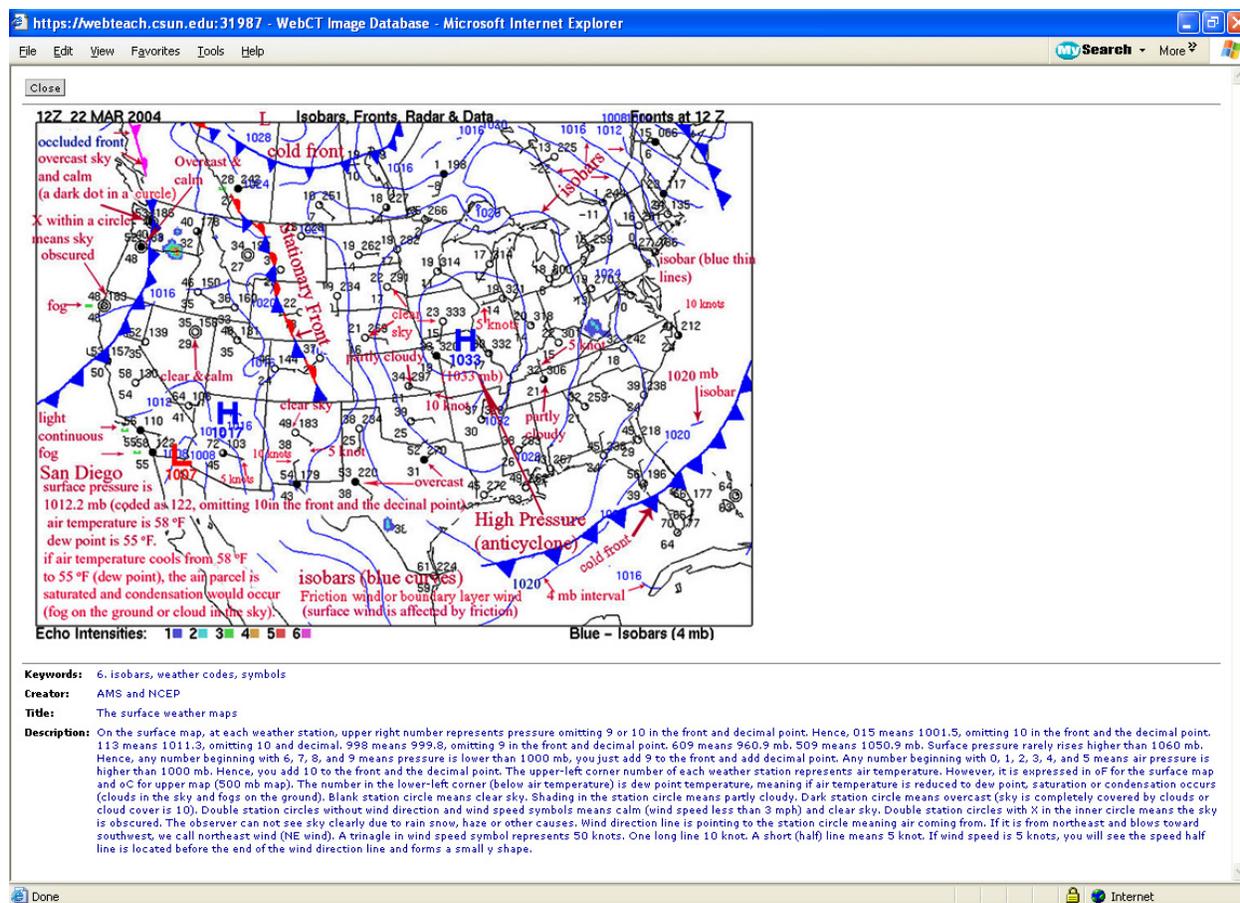


FIG. 7. Surface weather map interpretation in the Image Database.

## 5. QUIZ

The WebCT software offers five question types including multiple-choice, matching, calculated, short answer, and paragraph. The author employs multiple-choice questions for the three quizzes (Figure 8). Each of the three quizzes contains 50 multiple-choice questions. Besides, three practice quizzes, each made of 25 questions, are also placed in the Quizzes/Surveys screen (Figure 9). The practice quizzes let students accustom to the quiz format and procedure. Since the quiz is not proctored, the orders of questions and answers are randomized to avoid students copying answers from each other. Quiz groups (quiz 1, quiz 2, and quiz 3) are created by using "create quiz" option on the right column of the Quiz screen. Quiz questions are generated in the questions database. They are categorized into 12 course subjects such as Review, Surface Weather Maps, and Upper-Level Weather Maps, etc (figure 10). The randomized questions are imported into the individual quizzes by using quiz editor. The "Add question alternates" option in the quiz editor randomizes the question order while "Edit quiz settings" option randomizes the answer order. Students are allowed to take quiz beginning at anytime on the

scheduled quiz day. Each quiz lasts for 70 minutes. Students obtain their scores immediately after they submit quiz questions for grading. Once the entire class completes the quiz, scores are available for individual students to view from "My Grades" icon in the Homepage, from "View scores for quizzes" on the top of Quiz screen, and from "View scores" under the quiz title on the Quiz screen. The instructor is capable of monitoring the progress of a quiz (Figure 11) and to obtain a student's second-by-second quiz log (figure 12) from the "submissions" command on the Quizzes/Surveys screen. He can grade a quiz for a student who fails to submit the quiz questions for grading by checking the name of the student and then clicking "Grade" option on the right column of the "submissions" screen. He can also view a copy of quiz taken by individual students by clicking the value (1) under the "Submissions No" to reach the "view submission" screen (Figure 13). Clicking the "Submissions Time" on the submission screen achieves the same goal. Since a student is capable of viewing quiz statistics in "My Grades" from the Homepage, it is recommended that question answers should not be used as question titles that show up on the statistic table.

https://webteach.csun.edu:31987 - WebCT Quiz - Microsoft Internet Explorer

**Question 29** (1 point)  
Cellular clouds tend to occur

- a. behind a cold front.
- b. ahead of a cold front.
- c. in the warmest sector of a cyclone.

Save answer

**Question 30** (1 point)  
In the Antarctica (Halley Bay), the maximum ozone depletion in spring (October in the South Hemisphere) occurred at an altitude of

- a. 20 km (lower stratosphere)
- b. 30 km (middle stratosphere).
- c. 10 km (tropopause)

Save answer

**Question 31** (1 point)  
The following visible photo shows the presence of clouds from points C to A, but clouds disappear in infrared photo. The clouds from C to A is

- a. cirrus.
- b. cirrostratus.
- c. stratus.

Save answer

**Question 32** (1 point)

Time Remaining: 66 : 16 (min:sec)

Question Status:  
 Unanswered  
 Answered  
 Answer not saved

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15
16	17	18	19	20
21	22	23	24	25
26	27	28	29	30
31	32	33	34	35
36	37	38	39	40
41	42	43	44	45
46	47	48	49	50

Internet

FIG. 8. Example of multiple-choice questions.

The screenshot shows a WebCT interface for the course "Fall 2005: GEOG3110L The Atmosphere (14982 - Fa05)". The main content area is titled "Quizzes/Surveys" and contains a list of five quiz entries. Each entry includes a search icon, a title, availability dates, duration, points, and buttons for "Submissions", "Detail", "Reports", and "Summary".

Quiz Title	Availability	Duration	Points
first examination practice questions (no credit)	August 8, 2005 11:35am - Unlimited	Unlimited	/ 25
First examination (10-14-05, Friday)	October 14, 2005 12:00am - October 15, 2005 12:00am	70 minutes	/ 50
practice questions for 2nd Examination (no credit)	August 8, 2005 11:35am - Unlimited	Unlimited	/ 25
2nd examination (11-11-05, Friday)	November 11, 2005 12:00am - November 12, 2005 12:00am	70 minutes	/ 50
Practice questions for final examination	August 8, 2005 11:35am - Unlimited	Unlimited	/ 25

The right-hand sidebar contains several sections: "Actions" (Create quiz, Create survey, Create label, Edit, Delete, Edit titles), "Organize" (Indent, Move item up/down), and "Customize" (Customize page colors, Modify/Add background image, Modify/Add banner image, Edit/Add upper/lower textblock).

FIG. 9. Quizzes/Surveys screen showing practice and real quizzes and their associated messages.

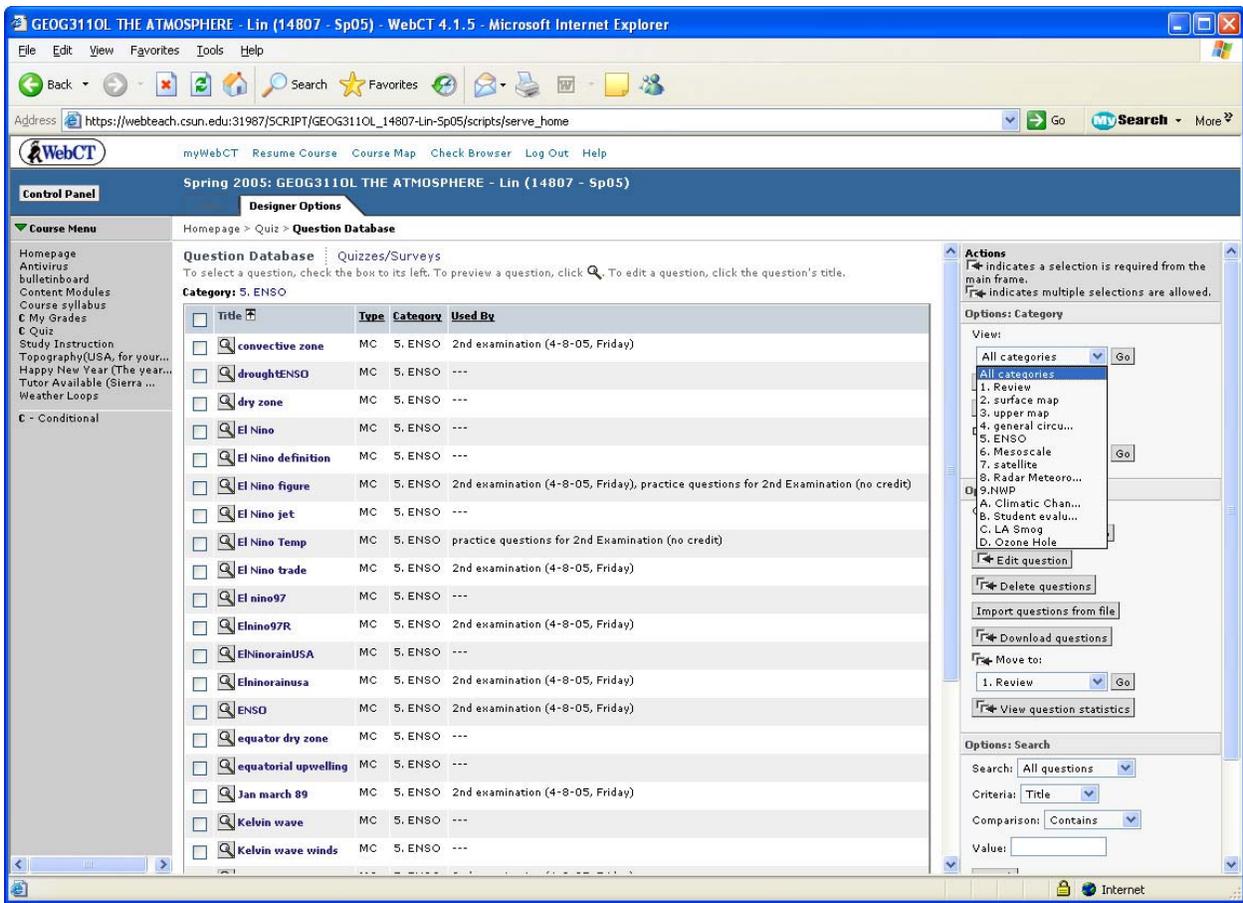


FIG. 10. Quiz database.

The screenshot shows a WebCT interface for monitoring quiz progress. The main content area displays a table of submissions for the 'First examination (October 14, 2005)'. The table has the following columns: Personal Information (User ID, Name), Grade (Out of 50), and Submissions (No., Score, Time, Status). The data is as follows:

User ID	Name	Grade (Out of 50)	No.	Score	Time	Status
	Abdi	43.0	1	43.0	01:07:26	Graded
	Ashikian	45.0	1	45.0	01:05:05	Graded
	Blavin	47.0	1	47.0	51:52	Graded
	Byrd	40.0	1	40.0	01:07:54	Graded
	Castellanos	46.0	1	46.0	01:00:43	Graded
	Choi	47.0	1	47.0	53:06	Graded
	Dickson	45.0	1	45.0	01:10:08	Graded
	Duncan	42.0	1	42.0	01:03:54	Graded
	Esslinger	47.0	1	47.0	37:54	Graded
	Ferguson	27.0	1	27.0	57:33	Graded
	Franklin	38.0	1	38.0	52:52	Graded
	Gamino	28.0	1	28.0	01:10:23	Graded
	Garcia	39.0	1	39.0	01:09:17	Graded
	Gill	39.0	1	39.0	56:55	Graded
	Gonzalez	49.0	1	49.0	18:26	Graded
	Halberg	---	---	---	---	Not taken
	Isaac	---	---	---	---	Not taken
	Khatik	46.0	1	46.0	01:09:52	Graded

The interface also includes a 'Control Panel' with 'Designer Options' and a 'Course Menu' on the left. On the right, there are 'Actions' (Reset, Grade) and 'Options' (Set page size: 50, Go).

FIG. 11. Monitoring quiz progress and record from submissions command on Quizzes/Surveys screen.

Date/Time	Access Type	Quiz Time	Remaining Time
October 14, 2005 12:59am	Quiz started	00:00	01:10:00
October 14, 2005 12:59am	Save question: 1	00:10	01:09:50
October 14, 2005 12:59am	Quiz redisplaved	00:11	01:09:49
October 14, 2005 12:59am	Save question: 2	00:27	01:09:33
October 14, 2005 12:59am	Quiz redisplaved	00:29	01:09:31
October 14, 2005 1:00am	Save question: 3	00:52	01:09:08
October 14, 2005 1:00am	Quiz redisplaved	00:54	01:09:06
October 14, 2005 1:00am	Save question: 4	01:01	01:08:59
October 14, 2005 1:00am	Quiz redisplaved	01:03	01:08:57
October 14, 2005 1:00am	Save question: 5	01:19	01:08:41
October 14, 2005 1:00am	Quiz redisplaved	01:20	01:08:40
October 14, 2005 1:01am	Save question: 6	01:38	01:08:22
October 14, 2005 1:01am	Quiz redisplaved	01:40	01:08:20
October 14, 2005 1:01am	Save question: 7	01:49	01:08:11
October 14, 2005 1:01am	Quiz redisplaved	01:50	01:08:10
October 14, 2005 1:02am	Save question: 8	02:47	01:07:13
October 14, 2005 1:02am	Quiz redisplaved	02:48	01:07:12
October 14, 2005 1:02am	Save question: 9	03:08	01:06:52
October 14, 2005 1:02am	Quiz redisplaved	03:10	01:06:50
October 14, 2005 1:03am	Save question: 10	04:03	01:05:57
October 14, 2005 1:03am	Quiz redisplaved	04:04	01:05:56
October 14, 2005 1:03am	Save question: 11	04:30	01:05:30
October 14, 2005 1:04am	Quiz redisplaved	04:32	01:05:28
October 14, 2005 1:04am	Save question: 12	04:42	01:05:18
October 14, 2005 1:04am	Quiz redisplaved	04:43	01:05:17
October 14, 2005 1:04am	Save question: 13	04:49	01:05:11
October 14, 2005 1:04am	Quiz redisplaved	04:50	01:05:10
October 14, 2005 1:04am	Save question: 14	05:00	01:05:00
October 14, 2005 1:04am	Quiz redisplaved	05:01	01:04:59
October 14, 2005 1:04am	Save question: 15	05:24	01:04:36
October 14, 2005 1:04am	Quiz redisplaved	05:25	01:04:35
October 14, 2005 1:05am	Save question: 16	05:32	01:04:28
October 14, 2005 1:05am	Quiz redisplaved	05:34	01:04:26
October 14, 2005 1:05am	Save question: 17	05:56	01:04:04
October 14, 2005 1:05am	Quiz redisplaved	05:59	01:04:01
October 14, 2005 1:05am	Save question: 18	06:27	01:03:33
October 14, 2005 1:05am	Quiz redisplaved	06:29	01:03:31
October 14, 2005 1:06am	Save question: 19	06:39	01:03:21
October 14, 2005 1:06am	Quiz redisplaved	06:40	01:03:20

FIG. 12. Student's quiz log.

The screenshot shows a WebCT interface for a quiz submission. The browser title is "GEOG3110L The Atmosphere (14982 - Fa05) - WebCT 4.1.5 - Microsoft Internet Explorer". The address bar shows the URL: "https://webteach.csun.edu:31987/SCRIPT/GEOG3110L\_14982-Lin-Fa05/scripts/serve\_home". The page content includes a "Control Panel" with "Designer Options" selected. The main heading is "View Submission: First examination (10-14-05, Friday)". Below this, a table displays submission details:

First examination (10-14-05, Friday)		
Name: Tanya Curry	Attempt: 1 / 1	Max. score: 50
Started: October 14, 2005 2:38pm	Finished: October 14, 2005 3:47pm	Time spent: 1 hr, 9 min., 32 sec.
Tanya Curry finished 0 min. 28 sec. ahead of the 70 min. time limit.		

Below the table, "Question 1" (1 point) asks: "When an air parcel rises adiabatically, it will undergo". The student's response is shown in a table:

Correct Response	Student Response	Answer Choices
<input type="checkbox"/>	<input type="checkbox"/>	a. compressional heating (volume decreases while temperature rises).
<input type="checkbox"/>	<input type="checkbox"/>	b. expansion cooling (volume increases while temperature drops).
<input type="checkbox"/>	<input type="checkbox"/>	c. both volume and air temperature decrease.
<input type="checkbox"/>	<input type="checkbox"/>	d. both air temperature and volume increase.

The score for this question is 1/1. Below the question, "Question 2" (1 point) asks: "The following weather map indicates that the 500-mb height at San Diego is". A weather map titled "500 height/temp for 00Z 29 JUN 03" is shown, with contour lines and values like 5617, 5572, 5527, 5472, 5427, 5372, 5327, 5272, 5227, 5172, 5127, 5072, 5027, 4972, 4927, 4872, 4827, 4772, 4727, 4672, 4627, 4572, 4527, 4472, 4427, 4372, 4327, 4272, 4227, 4172, 4127, 4072, 4027, 3972, 3927, 3872, 3827, 3772, 3727, 3672, 3627, 3572, 3527, 3472, 3427, 3372, 3327, 3272, 3227, 3172, 3127, 3072, 3027, 2972, 2927, 2872, 2827, 2772, 2727, 2672, 2627, 2572, 2527, 2472, 2427, 2372, 2327, 2272, 2227, 2172, 2127, 2072, 2027, 1972, 1927, 1872, 1827, 1772, 1727, 1672, 1627, 1572, 1527, 1472, 1427, 1372, 1327, 1272, 1227, 1172, 1127, 1072, 1027, 972, 927, 872, 827, 772, 727, 672, 627, 572, 527, 472, 427, 372, 327, 272, 227, 172, 127, 72, 27.

FIG. 13. Student's copy of quiz from "view submission".

## 6. CALENDAR (SCHEDULE)

Calendar is a very useful tool to provide students with study schedule. All students need to do is to complete the course assignments in the Calendar in order to prepare for quizzes. Monthly and weekly calendars can be displayed. It also provides links to course content files and weather related websites. A summary of main points for a given course subject or topic is placed in the calendar. However, it is a painstaking work to transfer the calendar from one semester to the next. Hence, the author has abandoned the use of this tool since spring 2004.

## 7. CHATROOM:

The author has discouraged his students taking completely online weather courses from contacting him by telephone or office visitation. Instead, the communications between students and the instructors are achieved by email and Bulletinboard. Chatroom tool is very useful for the life communications between students and the instructor. However, it requires a fast typing speed and maintaining an order of posting

messages in the Chatroom. It creates an enormous burden on the instructor dealing large student enrollments (approximately 200 students per semester) in general education (GE) classes. Hence, the author has discarded the Chatroom tool since spring 2004.

## 8. CONCLUSION

It is very helpful to generate three folders, course text folder, image folder, and icon folder, in the local computer before creating the online course Homepage. The course text folder contains all course subject files (or lecture note files) and the files of quiz study guides that are to be uploaded to the Content Modules. The image folder consists of all figures to be uploaded to the Image Database and Quiz database. Weather maps, satellite photos, radar images are available from the AMS Online Weather Studies website and the other weather websites established by major universities, research institutions, and government agencies (NOAA and NWS). The photoshop skill is needed to edit the figures in the Image Database. The icon folder is made of weather icons to be uploaded to the Homepage or Quiz database. In addition to the WebCT default link

icons, the instructor may obtain weather icons from "Google.com". The "Google" is a good source to find weather subjects, weather maps satellite photos, and radar images. All files in the local computer must be uploaded to WebCT "my-files" and then added to Homepage, Content Modules, Image Database, and Quiz.

The author developed his online weather courses before obtaining the license participating in the AMS Online Weather Studies Program. Most of the online course contents are based on the materials he had taught before for the regular classroom courses. The workshop of AMS online weather studies the author attended on May 16-21 2004 provided an excellent opportunity to enhance the author's knowledge of using various products from NWS for online course presentations. In contrast to the contemporary weather textbooks, the author's online weather and atmosphere courses contain image databases that use real weather maps and stuve diagram so that students would not feel out of the touch with the reality. The NCEP products, satellite photos, and radar imageries presented by the leaders of the NWS during the workshop provided invaluable sources of online teaching materials. The subjects on numerical weather prediction as well as satellite and radar interpretations learned from the workshop were incorporated into the author's online courses in the Content modules, Image Database, and Quiz.

The Faculty CD provided by the AMS Online Weather Studies program contains faculty menu, textbook diagrams and chapter test bank. The textbook diagrams can be uploaded into the WebCT Image Database. The chapter test bank in the Faculty CD and the Self-scoring test in the program website can be uploaded into the WebCT Quiz database by using Respondus software. The questions in the Quiz database can then be added to practice quizzes

(exercises) and the real quizzes. The faculty menu can be save as a pdf file and then uploaded into the WebCT Content Modules. Hence, a completely online weather course can be easily developed based on Faculty CD, textbook, and the materials in the AMS course and faculty websites.

The advantages of online courses are listed below:

1. Flexible schedules for both students and instructors.
2. Boost student enrollments substantially.
3. Painstaking work during the course preparation period but enjoyable after the completion of course preparation.
4. Instant computer grading. Student can check their grades at any time.
5. Near-real time weather maps, satellite photos and radar images from AMS online Weather Studies website and other links.
6. Lecture materials are more well-prepared than regular classes.
7. Enhance the instructor's knowledge of web tools.
8. Intriguing experiences by communication with students through email, Bulletinboard and Chatroom discussions.

The weaknesses of online courses are listed below:

1. Quizzes are not proctored.
2. Complaints of being unable to access the homepage or course content.
3. Complaints of computer problems during the quiz time.
4. Lack of student-instructor interactions.
5. Less effective in answering students' questions than the regular courses.
6. Increased frequency of virus- infected email attacks on the instructor and junk mails.