Software Testing Techniques — Syllabus

Class name  Software Testing Techniques
Sections  CS342-01 — 3 credit units
Regular meeting times  M., W., F., 8:50-9:45am
Lecture room  Wing 218
Lab  There is no lab section for this class
Course website  http://cs.uwlax.edu/~jmaraist/342-spring-19
Prerequisites  CS340
Catalog description  As the size and complexity of software projects have grown, so has the importance of ensuring program correctness. This course examines the issues of program testing, validation, and verification. Course projects require students to construct test data and to analyze the correctness of several software systems.

Instructor’s name  Dr. John Maraist
• Vocative "Dr. Maraist" or "Prof. Maraist", pronouns he/him/his
Office location  209 Wing Technology Center
Email  jmaraist@uwlax.edu
About  http://cs.uwlax.edu/~jmaraist
Office hours and appointments  My office hours and appointment availability are listed on the course website. To make an appointment, ask by email at least one school day ahead of time.
Additional references  Introduction to Software Testing, Paul Ammann and Jeff Offutt, Cambridge University Press, second edition, 2017; see the course website for other resources

Important dates
Monday, January 28  First class
Friday, March 15  Tentative date of Exam 1
March 18-22  Spring break
Friday, May 10  Tentative date of Exam 2
Tuesday, May 14, 7:45am  Project demonstrations (during final exam slot)
• I will confirm the actual exam dates at least two weeks beforehand.
• The final exam date and time is set by the university. Do not plan to leave until after this date.
Arguably no part of the software engineering process is so often overlooked as software testing. This oversight is extremely unfortunate, as proper testing could save industries $22 billion a year [NIST Planning Report 02-3: The Economic Impacts of Inadequate Infrastructure for Software Testing]. In this class, we will explore the area of software testing, helping to address this shortcoming. We will learn about both the theory and practice of software testing, providing you with a strong basis for being a better software tester. Furthermore, as we shall repeatedly see, learning about software testing will make you a more-capable and more-efficient software developer.

Assessment

There are several measures of your achievements in this class.

- **Assignments** — In the first half of the semester you will have assignments to help you learn JUnit.
- **Exams** — You will demonstrate your understanding of the topics we consider in class and in out-of-class reading on two closed-book/closed-notes mid-term examinations.
- **Presentations** — Preparing and presenting technical material is an essential professional skill. There will be several assigned presentations of technical material, in particular demonstrations of tools for which you must prepare both a presentation and a working demonstration.
- **Project** — In the second half of the semester you will complete a large project.

Most individual pieces of work will be assigned either an overall letter grade, or a numeric score on a 4-point scale. The letter grades and numeric scores are associated according to UWL's standard scale:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Score</th>
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<tbody>
<tr>
<td>F</td>
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<td>D</td>
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<tr>
<td>AB</td>
<td>3.5</td>
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<td>A</td>
<td>4.0</td>
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A score of 1.0 or greater on an individual piece of work is considered passing; a score below 1.0 is failing.

Assessing assignments

The assignments in this class are intended to help you learn to use the main tool which will study, JUnit. Each will be assessed according to the following rubric:
Along the course of the semester I will ask you to perform various administrative tasks: testing the LMS to make sure you can submit assignments, polls about office hours and other topics, exercises for group formation, etc. You will get credit for these tasks as an additional assignment (one single assignment, covering all of the tasks).

**Assessing exams**

Each exam will cover the material of one half of the semester. Exam question scores will be combined via weighted average, and the overall score converted to an exam letter grade no more strictly than as follows:

- **Above 90%** A
- 88-95% AB
- 82-88 B
- 76-82 BC
- 70-76 C
- 60-70 D
- 0-60 F

**Assessing presentations**

Each presentation will be assessed according to a rubric like that of Table 1. Some tailoring of this template may be necessary for the idiosyncrasies of individual tools, but the overall thrust of the criteria will hold for all presentations.

**Assessing the project**

The project in this class will involve adding tests to an existing open-source project. Your projects are optionally completed in groups, where each group is focused on a different open-source project, but all work will be attributed to an individual, and assessment will be individual.

The project will be scaffolded into several stages of group formation, project selection, and test design and deployment. Each stage as well as the overall project will be assessed on the usual 4-point scale. Project details will be posted before Spring Break.

**Overall score**

The four point scores of the various components will be combined into a single overall score as a weighted average as follows:

- Assignments after 1 and 2 will have the same weight
- Assignments 1 and 2 will be graded together, and together will have 1.5 times the weight of each individual other assignment
Table 1: Template rubric for presentations.
• These items will have the same weight:
  – All of the assignments taken together
  – Exam 1
  – Exam 2
• These items will have the same weight:
  – All of the presentations taken together
  – Both exams together
  – The project

Calculation of final letter grades
We calculate final letter grades using a variation of specifications grading:
To pass this class with a D, you must do both of the following:
  1. Complete two presentations to passing quality
  2. One of the following:
     • Pass the project and both exams
     • Earn a 2.0 or better on the project, and pass the combined exams
To earn a C, you must do everything required for a D, and also earn an overall score of 1.4 or greater.
To earn a BC, you must do everything required for a D, pass both presentations, and also earn an overall score of 2.3 or greater.
To earn a B, you must do all of the following:
  1. Earn at least a 2.0 on the project, and on every presentation
  2. Earn an overall score of 2.7 or greater
To earn an AB, you must do all of the following:
  1. Earn at least a 2.0 on the project, every presentation, and both exams
  2. Earn an overall score of 3.2 or greater
To earn an A, you must do all of the following:
  1. Earn at least a 3.0 on the project
  2. Earn an overall score of 3.7 or greater

Procedures and policies
Email and web page
The course website will be the primary means of communication information across the whole class; electronic mail will be our primary means of personal communication.

Course Website. The main web page for this class is listed at the beginning of this document. All class announcements will be posted to that page, and you are responsible for checking it regularly. That page also includes an RSS feed for updates. There are several services which will provide email updates from RSS feeds which you can find by a web search; if you choose to use one, pay attention to how often they check
the feed and send email.

*Email.* I will expect you to check your email regularly, and to read and understand messages relevant to this class. In particular, my feedback on your work will be delivered by email. By default I will use your school email address which I receive as part of the information about you that the university gives me, but I am happy to also use a different email address if you email it to me from your school email address. It is your responsibility to make sure that I have an email address which you can and will access regularly, and which you check at least once per business day. Note that we will **not** use electronic mail for submitting assignments; see the Submission and assessment of assignments section below. My university email account is the only forum which I regularly check; you should not attempt to communicate with me for class business via other email addresses, or other forms of social media. Some assignments in this class may require interaction via online forums.

For assistance with email or other matters relating to university computer and network services, contact [ITS](mailto:helpdesk@uwlax.edu) by phone at 608/785-8774, in person on the first floor of Wing Technology Center, or by email to helpdesk@uwlax.edu.

In general, during the semester I will respond to emails with questions about the material, requests for appointments, and other time-sensitive matters within one business day. For administrative matters, requests for regrades, or other matters which can wait a short while, I will usually respond within a week.

When you use email, make sure that you:

**Include your full name.** There’s a small army of you, and one of me. Make sure it’s easy for me to know who you are.

**Mention this class by name or number.** All of your instructors are almost certainly teaching more than one section.

**Write professionally.** Observe the forms of casual business writing, write in complete sentences, and use your spell-checker. Keep in mind that email to an instructor about a class is a different medium, and requires a different voice, than texts to a friend.

I have posted links to a number of guides to effective emailing on a web page of resources, accessible from my University home page given above.

### Attendance

I expect you to attend class. Our class meetings will be the only source for some class material, and will be the only venue for exams and presentations. There are no "makeups" for in-class participation opportunities. If you miss class, it is your responsibility to get notes from a classmate. We will not use class time, nor prioritize office hours and appointment times, to review things missed due to nonattendance. When I keep attendance...
Final examination times are scheduled by the university; make sure to plan any end-of-semester travel around them. Should an exam need to be rescheduled according to the university’s limit on the number of exams a student may take on the same day, you must give me notice as soon as you become aware of this situation. I will normally reschedule your exam to the first exam slot before our normal class slot in which you are not taking and I am not giving another exam.

Admission of latecomers to an examination may be refused after any student completes the exam and leaves the exam room.

I do not expect there to be review sessions for this class outside of regular lecture/lab times.

**Submission and assessment of assignments**

Each assignment is to be submitted via the electronic submission system detailed in that assignment. I expect that we will primarily use D2L in this course, but you must always check each assignment for the correct procedure. We will *not* be using email for assignment submission; assignments emailed to me will *not* be considered validly or on-time submitted unless either the particular assignment specifically calls for email submission, or I have specifically instructed you to email me an assignment. You are responsible for ensuring that you upload the correct file to D2L, and in the case of multi-file submissions packed as a ZIP archive, for ensuring that the correct contents are all included in the submission: in particular, make sure that you re-download your work to make sure that the server actually has the file you expect. Submissions for programming assignments should consist of fully-functional code which behave as specified in the assignment.

My assessment of your coursework will be returned in compliance with FERPA regulations, either directly to you or via email. As described under *Email* above, I will email you either at your official university email (which only you are authorized to access), or to an alternate email address which you designate. In this way only you will have access to your grades unless you take specific action otherwise.

After you have completed the course, copies or records of your graded material that I retain will be accessible up to 7 weeks into the next academic term (either Spring after Fall or J-term; or Fall after Spring or Summer).

I plan to provide feedback on formative assessments *submitted on-time* within 21 days of the final deadline for that assessment, and to notify you when circumstances require delay.
Assignments submitted late
Assignments submitted electronically are due at 8:00am on the deadline day. Late work will be accepted at a penalty until I download assignments for grading; at the point when D2L submissions are closed, no further assignments will be accepted.
Penalties for late work on individual course components will be specified in the syllabus, in their specifications, or in their sample rubrics.
See the Accommodations for individual circumstances section below for extenuating circumstances that impact your ability to meet deadlines or participate in class activities.

Equity of course execution
This course will be delivered and assessed fairly, in the specific sense that all students in this section will have equivalent opportunities to demonstrate their mastery of the subject, and will be assessed according to the same criteria. The only assessed work and the only criteria for assessing that work, and thus for the grades derived from it, will be as set forth in this syllabus.

Mindfully attempting to be assessed by more lenient criteria than one’s colleagues, or by criteria other than the work for and conduct in this class as described in this syllabus, is unprofessional and will be considered a form of academic misconduct.

Errors and regrading
If you find an error in the evaluation of your work, you have the right to ask for it to be regraded.
• All requests for regrading must be by email.
• All requests for regrading must detail specifically where the suspected error was made, and what the error is.
• All requests for regrading should be made no sooner than 24 hours, but within one week, of the evaluation of the work being returned to you. If the assessment of some piece of work is returned in stages, the deadline for requesting a regrade will be within a calendar week of when the report containing the suspected error is returned to you.
• To ensure that a uniform standard is applied across the class, all regrading will use the same criteria and rubric applied to everyone else.
• In general, an entire assignment or exam may be regraded in response to a regrading request, even if your request addressed only a proper subset of the original. So make sure that errors to your detriment outweigh errors in your favor.

You will always be notified of errors I find in the evaluation of your work after it is returned to you, as well as any resulting change to your grade, even if you did not request a regrade.
Collaboration

I encourage you to work together to understand course material. Learning together is a great way to learn and share ideas, and is a useful professional skill. However, in order to actually learn something, it is important that you complete the real work of programming on your own. It is acceptable to:

• Discuss the general approach to an assessed problem with each other.
• Discuss and solve other, unassessed problems together.
• Work together to install software we’ll use, or get it to work properly on individual computers.
• Help each other figure out syntax errors when code isn’t compiling.
• Help each other isolate and debug problem spots when code isn’t running correctly.

However:

• It is not OK to write code together, or to copy code from anyone inside or outside of the class.
• It is not OK to simply copy code, whether from online, a book or printed article, other people, or any other source. You can use online references to get additional explanations of how Java works, or to learn programming techniques. But the only way to actually gain the skill of programming is to write code yourself.

Any improper behavior with respect to these guidelines will be dealt with as academic misconduct according to University policy.

Academic integrity and acceptable use policies

Academic misconduct is a violation of the UWL Student Honor Code and is unacceptable. I expect you to submit your own original work and participate in the course with integrity and high standards of academic honesty. When appropriate, cite original sources. Plagiarism or cheating in any form may result in a diminished grade or failure of the assignment or of the entire course, and may include harsher sanctions. As necessary I will use resources provided by the university or other services to verify the originality of submitted work. Refer to the Student Handbook for a detailed definition of academic misconduct.

In general,

• You can share ideas, but you may never share code.
• You must independently write all of the code you submit and never copy code from anyone inside or outside of the course to complete an assignment.
• You are expected to be able to fully explain every line of Java code that you write, and may be asked to do so for any given assignment.

In interpreting these general guidelines, "you" should be taken to mean the unit designated to complete one assignment. Except where explicitly stated otherwise in an assignment, all assignments are individual assign-
ments, and it is individuals who may not collaborate on code. Where an assignment is explicitly deemed to be a group assignment, the individuals within a group may freely share material with each other, but never with individuals in other groups.

The article 'Avoiding Plagiarism' on the Murphy Library website offers helpful information on avoiding plagiarism. You may also visit the Office of Student Life if you have questions about plagiarism or cheating incidents. Failure to understand what constitutes plagiarism or cheating is not a valid excuse for engaging in academic misconduct. Acadia University offers a light-hearted ten-minute interactive tutorial on avoiding plagiarism at library.acadiau.ca/sites/default/files/library/tutorials/plagiarism

UWL and UWS policy also mandates responsible use of shared computing resources. In particular, your authorization for the use of administrative server resources such as course management systems (like D2L or Canvas), program submission and auto-evaluation systems (like AutoLab or WebCat), the course web site, or other assigned systems is strictly limited to the purpose described in course assignments and other material. Any disruption, exploration and/or exfiltration of system components is strictly prohibited, and may also constitute academic misconduct. Login credentials to university and other systems used for coursework may not be shared, and any such sharing may be taken as firm and sufficient evidence of assignment non-originality. More information about the UWS policy on Acceptable Use of Information Technology Resources is available at www.wisconsin.edu/regents/policies/acceptable-use-of-information-technology-resources

Professional conduct

Interacting with peers and with me in a constructive, respectful and professional manner, being a constructive and supportive presence in class, handling difficulties with grace and resilience, operating as an autonomous and responsible adult, fulfilling commitments, and approaching work with enthusiasm are all valuable professional (and life) skills, and are firm expectations of this class. Part of your final grade in this class will be determined by the quality and consistency of your professional conduct, whether online, in class, or in office hours.

One aspect of being a constructive and supportive presence in class is simply not being disruptive to the class. Attendance carries the obligation of being a constructive presence, or at least, a non-disruptive presence. In particular:

- Cell phones and other electronics must be silenced for the duration of class. Consider using an app like Shush! or Silent Time (for Android), or AutoSilent (for iPhone) to manage silencing your devices automatically.
- If you need to arrive to class late or leave early, be mindful of creating a minimum of disruption: sit near the exit and on the end of the
aisle, pack lightly, and avoid using materials in class which are noisy on packing/unpacking.

- Research has shown that screen use in class is distracting not only to the student using a device, but also to that student’s neighbors. So if you plan to use a screened device in class, I’ll expect you to sit in the back row so that your screen distracts the fewest people. Likewise, if you plan not to use a screened device, you should sit away from the rearmost rows.

In cases of egregious, repeated or persistent disruptive conduct, of mindful discourtesy or of any intimidation of anyone in class, or of isolating or shaming conduct based on gender, race or other identity issues, I may require you to leave class immediately, possibly on an ongoing basis.

Findings of academic misconduct and/or unacceptable use of course resources may also result in loss of graded credit for professional conduct. In particular academic misconduct on a project, major assignment or any examination, as well as multiple instances academic misconduct and/or unacceptable use of course resources, will result in the loss of most if not all credit for professional conduct.

**Concerns or complaints**

If you have a concern or a complaint about either the course or me, I encourage you to bring it to my attention. My hope would be that by communicating your concern we would be able to come to a resolution. If you are uncomfortable speaking with me, or if you feel your concern has not been resolved after bringing it to my attention, you can contact my department chair or the [Office of Student Life](#).

The Student Academic Non-Grade Appeals process can be found in the [Student Handbook](#). Information about appeals and petitions for academic matters is in the [UWL Catalog](#).

I normally give anonymized examinations: you will sit at a desk tagged with your name; rather than writing your name on the exam, you will write the number on that tag. The anonymity allows us all to be more confident in the accuracy and uniformity of assessment across the class. However, that anonymity extends only through the completion of assessing the individual exam questions. After marking I will de-anonymize the exam papers to understand both individual and group trends and weaknesses, and to address them through subsequent improvements to the class. So exam papers should *not* be considered an anonymous forum for suggestions or complaints.

**Sexual harassment**

As an employee of the University of Wisconsin-La Crosse, I am a mandated reporter of sexual harassment and sexual violence (which include sexual assault, domestic violence and stalking) that either takes place on campus or otherwise affects the campus community.
So if I receive detailed or specific information about an incident such as the date, time, location, or identity of the people involved, I am obligated to share this with UWL’s Title IX Coordinator in order to enable the university to take appropriate action to ensure the safety and rights of all involved. It does not matter whether the incident took place on- or off-campus; it matters only that a person who is a member of this campus was involved in the incident.

It is possible that course assignments may lend themselves to disclosure, but you should not share any details of an incident with me until you have discussed your options under the new Title IX guidelines. There are confidential reporters available to students at UWL where you can have this discussion.

For students not wishing to make an official report, there are confidential resources available to provide support and discuss the available options. The contact in Student Life is Ingrid Peterson, Violence Prevention Specialist, 608/785-8062, ipeterson@uwlatx.edu. For more resources or to file a report, please see www.uwlax.edu/violence-prevention.

I am also happy to help direct you to counseling and support services. Simply ask me to assist you in locating a confidential reporter and I will help you to do so.

**Class interruptions and cancellations**

In the event of a campus incident that impacts the availability of teaching spaces, any changes or cancellations will be communicated to you via your university email account. Depending on the incident, some or all of the information might be posted on the UWL home page.

In the event of inclement weather, we will follow the University’s closure policy. If classes are not canceled, I will make every effort to be in class on time, and so should you. Please do not send me email asking whether class is going to meet; instead, check the university website. The university’s emergency readiness plan is available online; that page also describes sign-ups for individual emergency alerts. In the event of a cancellation, consult the course homepage for any alternative assignments or other arrangements.

**Accommodations for individual circumstances**

It is my goal that all students have equivalent opportunities to succeed in this class. This section discusses the general procedures for alternative assessment accommodations in this class, as well as a number of specific situations for which there are standard mechanisms and policies in place to achieve the goal via accommodations for individual circumstances.

**General procedures and constraints.** Students may propose alternative assessments for assignments and exams for matters outside of a student’s control such as documented non-chronic illness, bereavement,
unplanned university equipment unavailability, or university program travel or activities.

- In almost all cases, you will work with a campus office (usually one of the ACCESS Center, Veterans Services Office, or Office of Student Life) to design and manage your accommodations. They will have confidential access to the full details of your situation, and so they will be the sole authority who can certify that the accommodations you propose are both necessary and sufficient for your situation. Moreover all accommodations shall be reviewed by the same office: the necessity and sufficiency of the overall accommodation for your situation cannot be accurately assessed otherwise.

- Any accommodation must also ensure that the required objectives for this course are assessed as thoroughly as under standard procedures. It is my role to judge whether any proposed accommodation meets this requirement.

- It is your responsibility to propose assessment alternatives which which are both approved by the overseeing campus office as necessary and sufficient to accommodate your circumstances, and approved by me as appropriate for the original assessment's objectives.

- All requests for accommodation must be accompanied by appropriate supporting documentation. In most cases this documentation will be reviewed by a separate group on campus such as the ACCESS Center or Veterans Services Office, and I will not see specific details. Where no such campus group applies, the specific form of documentation will be at my discretion.

- Proposals for alternative assessment must be made at least ten calendar days before any relevant major deadline or exam. If a proposal cannot be made in time due to medical or other emergency, the proposal should be made at the earliest possible point.

- Alternative assessment proposals should address relevant big-picture issues in addition to immediate course matters.

- Alternative assessment proposals must be explicit, and must be sent only by email or in writing.

- Students proposing alternative assessments should never simply assume that their proposal will be granted verbatim, and must allow time for thoughtful review of all proposals.

- Extracurricular and student groups/activities, planned personal trips, and similar elective activities are not considered to be outside of a student's control, and do not qualify for alternative assessment.

- Accommodations are generally not available for the activities of other classes. Do not schedule activities for other classes during the lecture/lab/exam times of this class; you are not "free" at those times.

- Accommodations should enable you to complete the assessments for this class during the regular semester. I will avoid recording incomplete grades as part of an alternative assessment plan for any situation which
has previously been addressed by accommodation, whether at UWL or other institution, whether via the ACCESS Center or not. Incomplete grades will also not be used where an advisor’s or other credible recommendation for a reduced load, for a particular semester or on an ongoing basis, was disregarded or avoided; you are expected to design a feasible schedule with your (formal and informal) advisors.

- The goal of providing equivalent opportunities to succeed in this class to all students enrolled in the class means that there will not be individual variations to assessment in this class except as allowed in this section. Thus "extra credit" and other alternative assessments not included in the class-wide assessment plan are specifically disallowed.

**Disabilities and medical conditions.** Accommodations for a documented disability or medical condition are made via the ACCESS Center. You must contact The ACCESS Center and meet with an advisor to register documentation of your situation, and to develop and propose alternative assessments.

- Examples of the disabilities and conditions for which this procedure applies include, but are not limited to: ADHD; autism spectrum disorder; acquired brain injury; PTSD; and physical, sensory, psychological, or learning disabilities.

- The ACCESS Center is located at 165 Murphy Library, and is reachable by phone at 608/785-6900 and by email at ACCESSCenter@uwlax.edu. Interactions with the ACCESS Center and with instructors should be initiated promptly. For issues and conditions identified prior to the semester, you should contact the ACCESS Center prior to the semester in order to propose and confirm an accommodation plan before assignments are due. For issues arising during the semester, you should contact the ACCESS center to initiate their accommodations process promptly after a diagnosis. Accommodations will not be applied retroactively in the case of a delay in initiating the ACCESS Center process. Once some alternative assessment accommodation is arranged for you via the ACCESS Center in this class, any other accommodations for you as well as any changes or extensions to your accommodations, including those arising from changes in your underlying condition or disability, must also be arranged via ACCESS Center procedures (see Changes to accommodations below), and must follow the procedures described elsewhere in this syllabus.

You can find out more about services available to you with disabilities at The ACCESS Center website, www.uwlax.edu/access-center.

**Veterans and active military personnel.** Veterans and active military personnel with special circumstances (e.g., upcoming deployments, drill requirements, disabilities) are welcome and encouraged to discuss these issues with me, and I expect you to do so as far in advance as possible.

For additional information and assistance, contact the Veterans Services Office, www.uwlax.edu/veteran-services. Students who need to withdraw
from class or from the university due to military orders should familiarize themselves with the university's current military duty withdrawal policy, catalog.uwlax.edu/undergraduate/academicpolicies/withdrawal.

**Religious accommodations.** Per the UWL Undergraduate and Graduate Catalogs, "any student with a conflict between an academic requirement and any religious observance must be given an alternative means of meeting the academic requirement. The student must notify the instructor within the first three weeks of class of specific days/dates for which the student will request an accommodation. Instructors may schedule a make-up examination or other academic requirement before or after the regularly scheduled examination or other academic requirement."

**University athletics.** Student athletes are expected to submit the semester's full schedule, including expected travel times and possible championship tournaments, by the end of the first week of class. I realize that your coaches' official letter may not be ready by that time: that letter can come later. But you are able and expected to collect and convey the information yourself, and later follow up with the official documentation.

In the event of cancellations or postponed events, I expect you to inform me in email before our next class meeting of the cancellation. In that email, you should also indicate to the best of your knowledge whether the university is attempting to reschedule the event later in the semester.

**Changes to accommodations.** Accommodations can change by mutual consent to reflect changed circumstances. Changes should follow the same review and implementation mechanism as the original accommodation; in particular where the ACCESS Center reviewed and recommended original accommodations, I will expect changes or parallel accommodations to be reviewed and recommended through the ACCESS Center.