

Needs Assessment Report: TAs and GPTIs in the College of Arts & Sciences

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ASSETT is Arts & Sciences Support of Education Through Technology

Our mission is to further the A&S mission of teaching and learning in the context of a research university, by:

...developing and delivering dependable and effective technology-enabled programs.

...pursuing concrete objectives and engaging diverse stakeholders, and initiatives while also providing opportunities for growth and innovation.

...improving teaching and learning through assessment, feedback, dissemination of results, and knowledge of best practices.

ASSETT is driven by teaching and learning needs and activities in the College of Arts and Sciences. Consistently guided by a pedagogy-centered perspective, ASSETT works to develop and maintain reliable, dedicated IT resources that support and advance the quality of teaching and learning across the College of Arts & Sciences. ASSETT invests its resources to foster the flexibility and adaptability needed in a dynamic and quickly evolving technology environment.

2011-2012 Needs Assessment: TAs and GPTIs

Executive Summary

Assessing the nature of graduate student teaching in the College of Arts and Sciences

From October 2011 – April 2012, we gathered data about the teaching experiences of graduate students who teach in the College of Arts and Sciences. The goal of this needs assessment is to use the results to select and design resources appropriate for meeting the needs of this group.

In Fall 2011, the Assistant Director for Assessment and Evaluation met individually with graduate directors and staff in 31 A&S departments to learn how each structures graduate student teaching. In Spring 2012, focus groups were held with the graduate student teachers themselves.

Efforts were made to hold a focus group in each department; we were able to arrange a total of 26.

Focus group discussions centered on the teaching experiences of participants, their use of technology in their teaching, how they communicate with students in and outside of the classroom, the challenges they encounter in their teaching, and what resources they would find helpful in their teaching/would like to know more about.

Summary of Findings:

Graduate student teaching is highly varied across departments: Experiences vary in terms of content taught, course structures, teaching activities, and the number of students taught. Additionally, departments vary the amount of autonomy they grant to graduate students in their teaching, partially due to the types of course sections which graduate students teach and whether or not graduate students are all teaching the same courses. The number and types of course sections allotted to graduate students is also highly variable.

Technology use is ad hoc, generally dependent on local or individual factors: Graduate students use a wide variety of technology tools in their teaching, ranging from PowerPoint to Ning. Graduate student use of technology generally depends on what resources are available to them in classrooms and from their departments, on the content that they teach, on how their teaching is structured, and on their knowledge of and interest in technology resources.

Main challenges:

A lack of time. Across groups, participants cited not having as much time as desired for teaching, especially in relation to research and coursework requirements. A lack of time can also mean that departmental resources aren't used, because learning them takes time.

A lack of autonomy. Having teaching practices determined to some degree by the course instructor/course set-up can also be a challenge, including restrictions on the ability to make decisions about technology use.

A lack of resources. Participants cited lack of access to technology resources as a challenge as well as lack of knowledge about teaching in general and about how to use technology to facilitate their teaching.

Student engagement. Graduate students cited a number of challenges they encountered with student engagement. Most of these challenges centered on students' skill sets and participation.

Resources identified by participants as potentially useful:

1. Easily accessible information about how to use specific tools and software, such as Clickers or Voicethread.
2. Easily accessible information about what technology is available to facilitate different types of teaching and about how to use technology in a pedagogically sound manner.
3. Processes and structures for sharing teaching materials both within their departments (for the departments in which this doesn't already exist) and across departments within the College.
4. Access to technology tools to use in the classroom, upgraded classroom facilities, and discipline specific resources, such as a way to easily write and send equations to students.
5. Active promotion of and assistance with technology use in the classroom via courses, recognition of technology use in the classroom, online resources, and one-on-one assistance.

Background

Since its inception, ASSETT has been dedicated to facilitating education in the College of Arts and Sciences via technology. The diverse services that ASSETT provides in line with this mission have been aimed primarily at faculty and staff, up to this point in time, to improve the educational experience of the College's undergraduate students. One of ASSETT's high level priorities has been to expand these services to graduate students who teach undergraduates either as Teaching Assistants (TAs) or Graduate Part-Time Instructors (GPTIs). In order to address that priority, extensive staff resources were devoted to conducting a needs assessment of TAs and GPTIs during AY 2011-2012. The purpose of this needs assessment is to understand the nature of graduate student teaching in the College and how ASSETT can best direct its services to support the work of graduate student teachers.

Extent of Graduate Student Teaching in the College

Data from the Office of Planning, Budget, and Analysis for AY 2009 – 2010 and 2010-2011 show that graduate students provide a significant portion of the instruction undergraduates receive in the College. This report includes data on the total number of course sections taught by graduate students within the College of Arts and Sciences, including Teaching Assistants (TA's), Grad-Part Time Instructors (GPTI's), Graduate Assistants (GA's), and various other forms of graduate student teaching positions. Note that the charts reflect the following missing data: Spring 2010 - MCDB; Fall 2010 – APS, EBIO, IPHY, MCDB; Spring 2011 – APS, EBIO, MCDB.

Chart 1 below illustrates the graduate student teaching trends from Fall 2009 – Spring 2011, broken down by divisions within the College of Arts and Sciences. An average of 40.3% of course sections within the Social Sciences Division were taught by graduate students, followed by Natural Sciences (26.5%), and Arts and Humanities (25.2%).

Charts 2, 3, 4, and 5 show the percentage of course sections taught by graduate students in each semester. From Fall 2009 to Spring 2011, the average percent of graduate student teaching appointments across all departments decreased from 28.1% to 22.1%. Some fraction of this decrease should be attributed to the missing data.

Charts 3, 4, and 5 also identify departments that experienced a significant increase or decrease in the percent of graduate student teaching (=>5% change + or -) from the previous semester. A positive change is represented on each graph with **GREEN** and negative with **RED**. Excluding the departments with missing data, the table below lists the departments that experienced this change. Five departments exhibit a pattern of a lower number of appointments in Fall semesters than in Spring semesters (indicated in the table below in **bold**).

	Spring 2010 from Fall 2009	Fall 2010 from Spring 2010	Spring 2011 from Fall 2010
=> 5% increase	AAAH ALAC HUMN	AHPC GEOL ARSP GSSL CLAS HIST COMM IAFS FILM MATH	ALAC ANTH IPHY LING PSCI SSPC
=> 5% decrease	AHPC GSSL APPM HIST CHEM MATH COMM PHIL FILM PHYS GEOG RLST GEOL	ALAC PHYS ANTH PSCI ATOC WMST CHEM LING	AAAH GEOL AHPC HIST AIFS MATH APPM PHYS ARSP PSYC CHEM WMST FILM

Charts 6, 7, 8 and 9 present the total number of graduate students teaching across departments per semester. Note that the type of appointment (e.g., TA, GPTI) is not indicated, and the total number of courses includes all sections in multi-section large lecture courses.

Percentage of Course Sections Taught by Graduate Students (TAs or GPTIs) within the College of Arts & Sciences by Division - 2009 - 2011

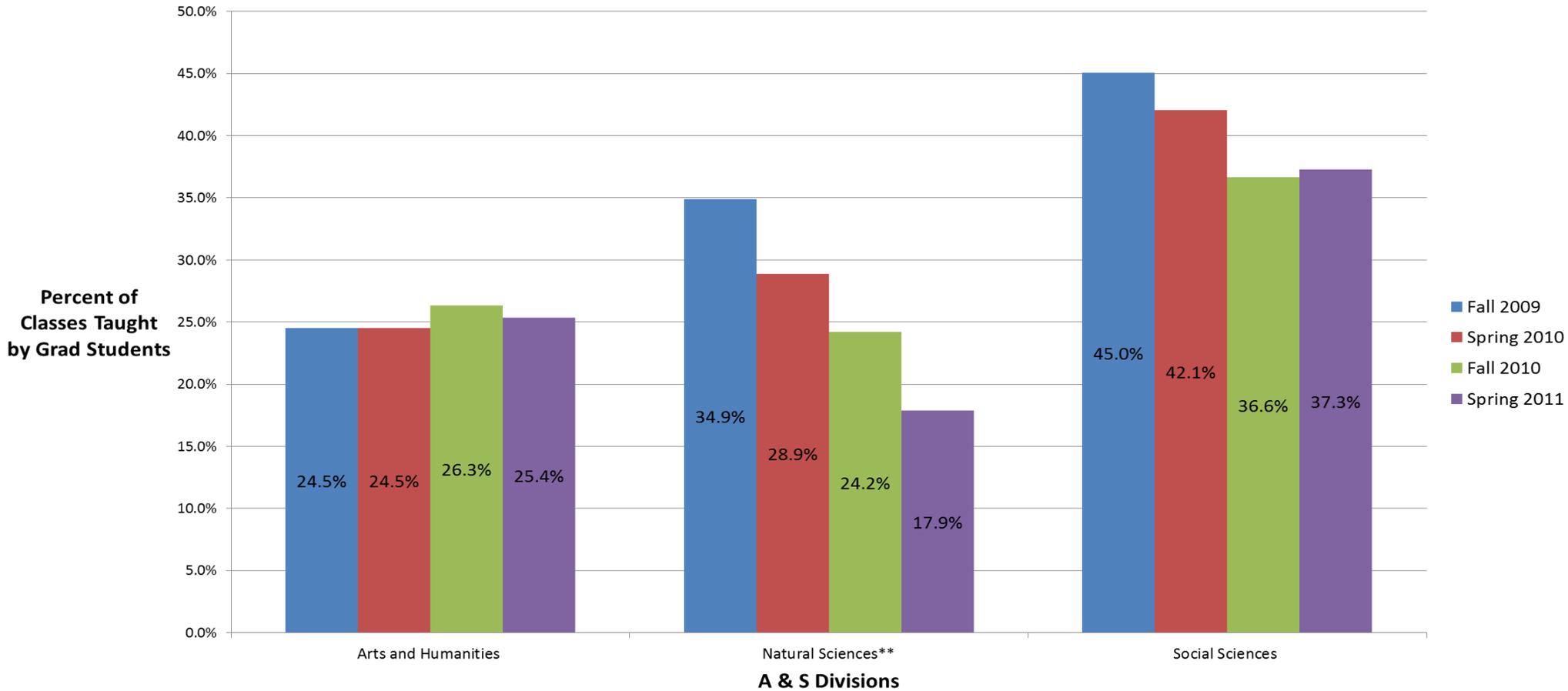


Chart 1

*** It should be noted that for Spring 2010, PBA data listed 0 graduate students teaching in MCDB. The same is true for APS, EBIO, Integrative Physiology, and MCDB for Fall 2010 and for APS, EBIO, and MCDB for Spring 2011. This data, therefore, do not fully reflect the number of graduate students teaching in Natural Sciences.*

Percentage of Course Sections Taught by Graduate Students within the College of Arts & Sciences by Department - Fall 2009

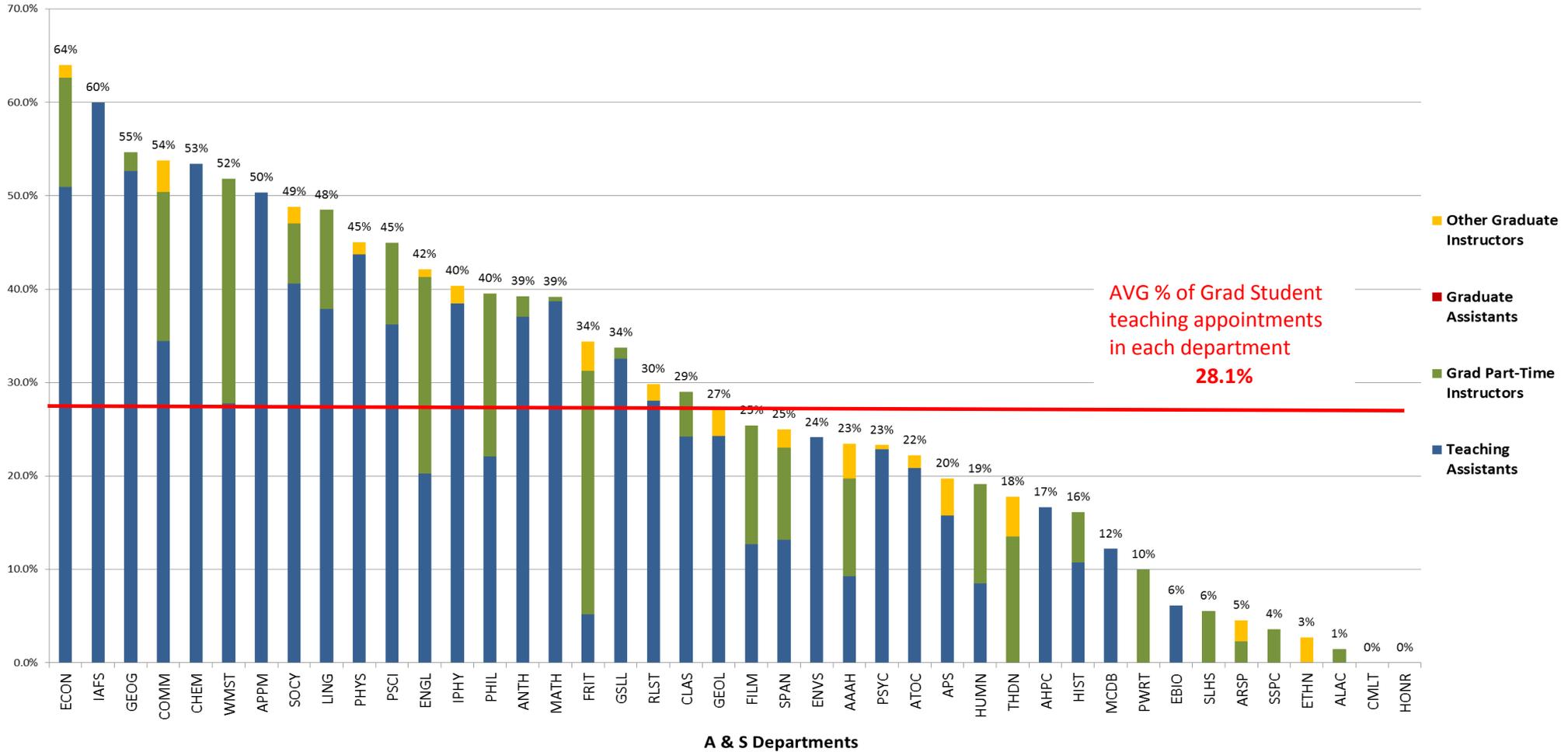


Chart 2

Percentage of Course Sections Taught by Graduate Students within the College of Arts and Sciences by Department - Spring 2010

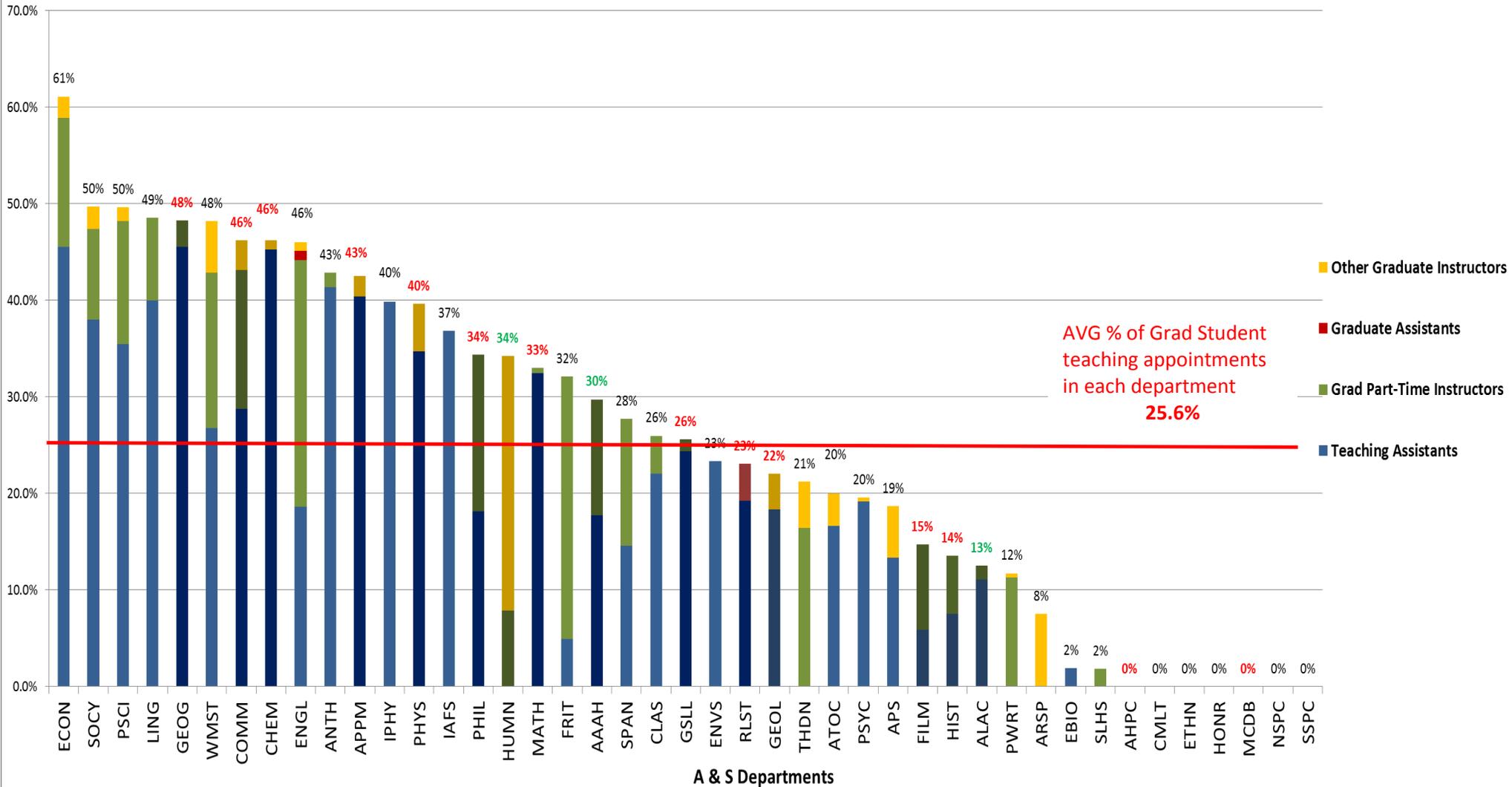


Chart 3

Percentage of Course Sections Taught by Graduate Students within the College of Arts & Sciences by Department - Fall 2010

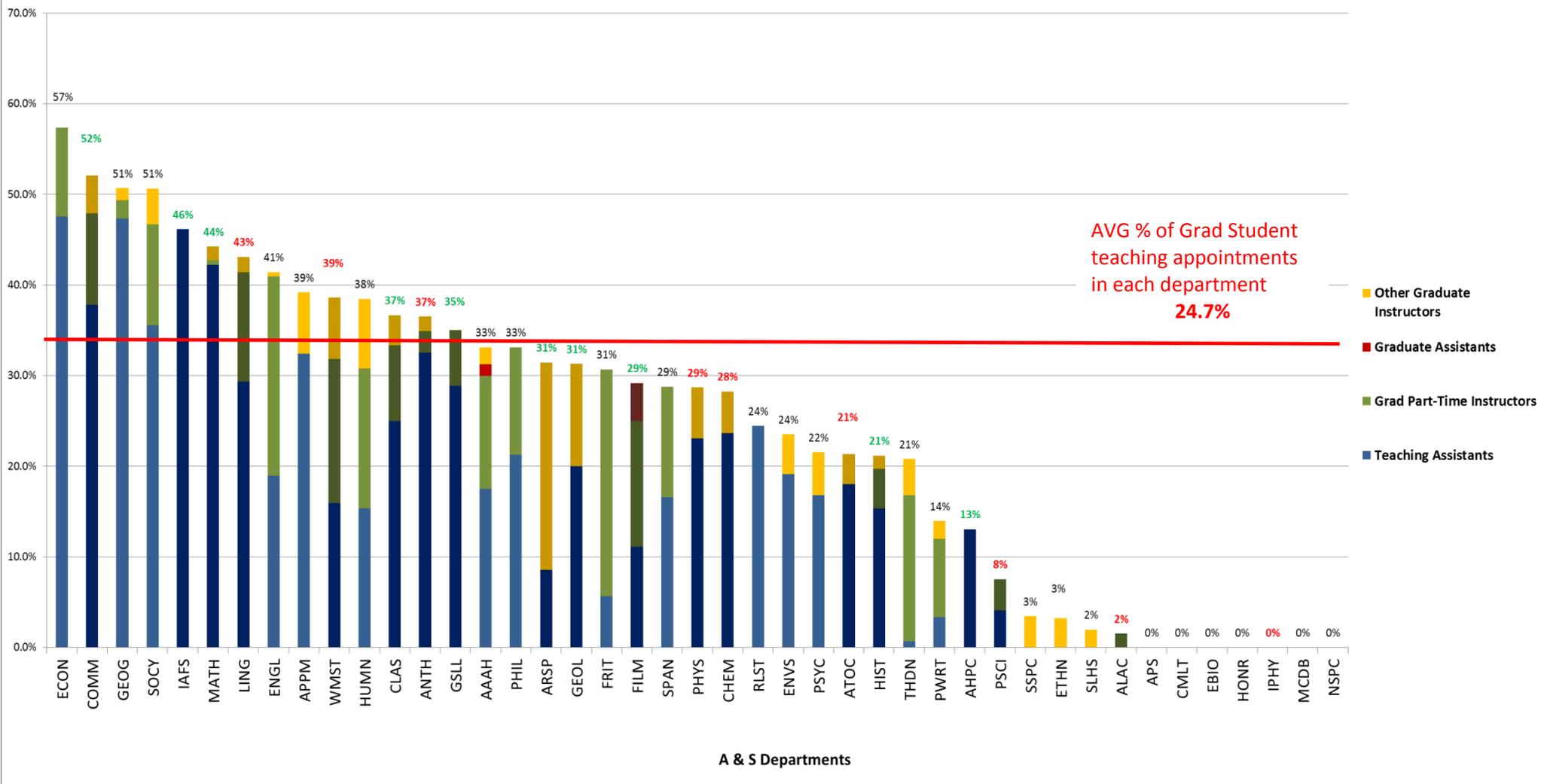


Chart 4

Percentage of Courses Taught by Graduate Students within the College of Arts & Sciences by Department - Spring 2011

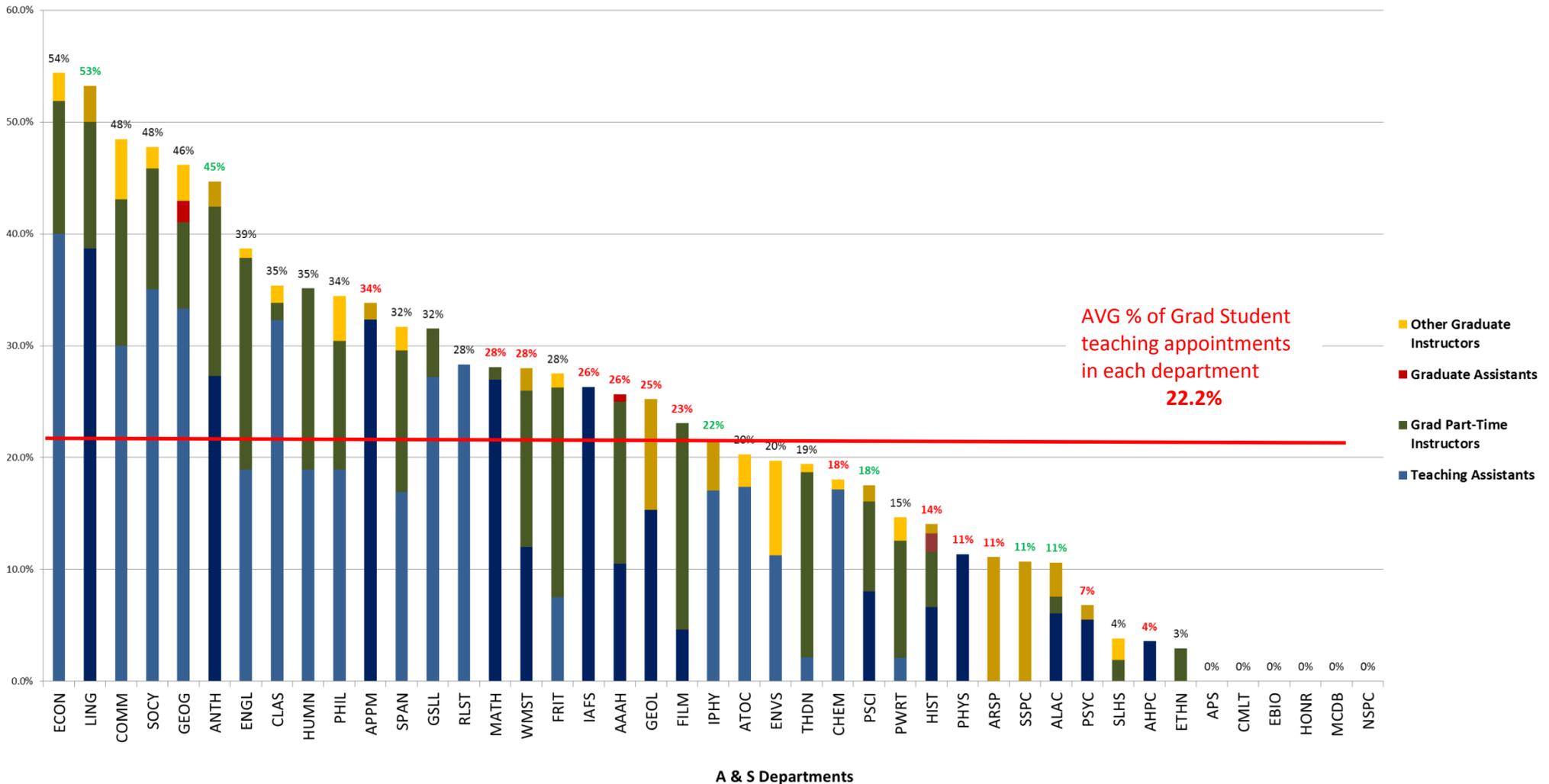


Chart 5

Number of Course Sections Taught by Graduate Students (Departments) - Fall 2009

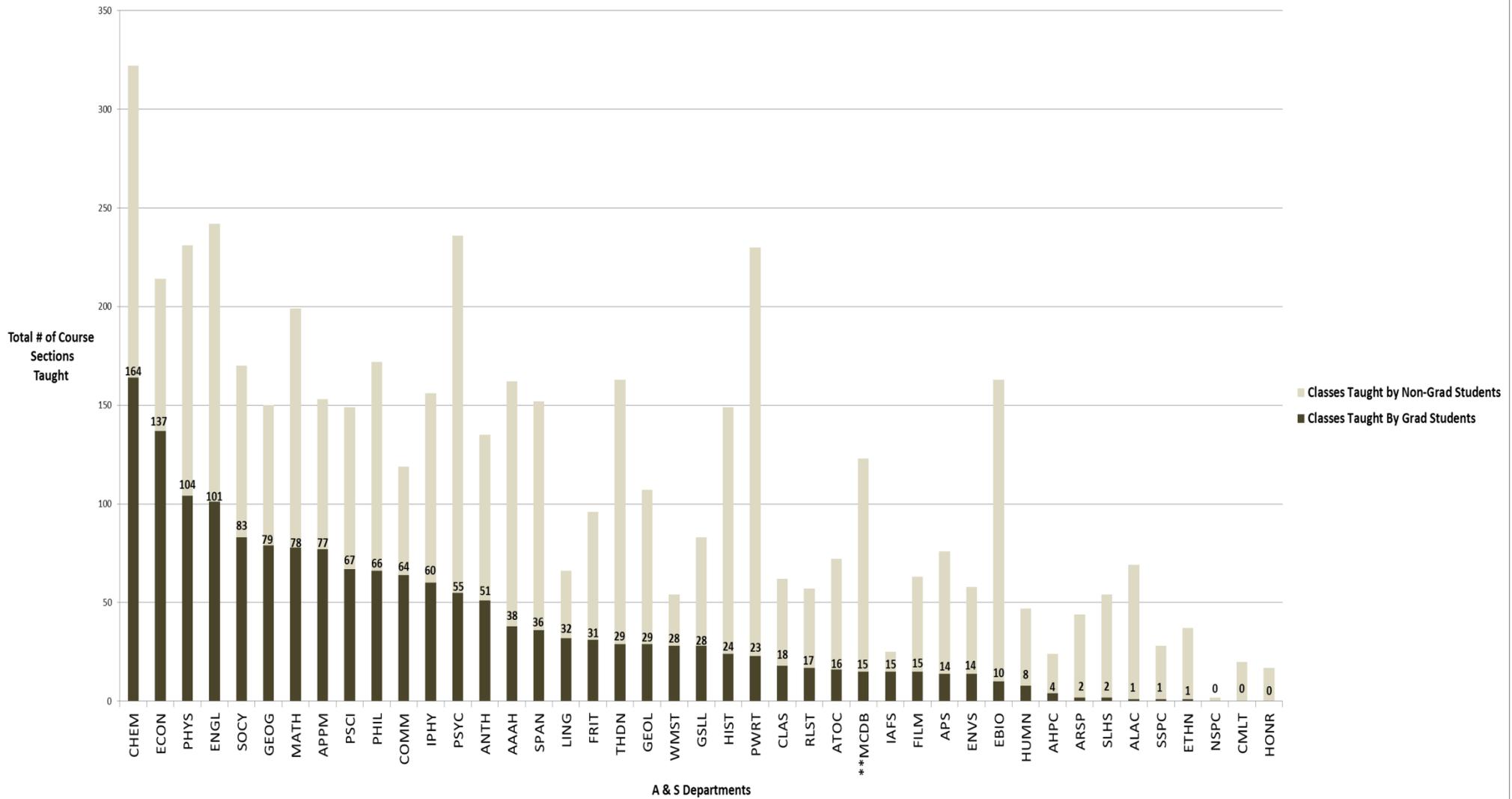


Chart 6

** For Charts 6, 7, 8, and 9, these Departments have missing data.

Number of Course Sections Taught by Graduate Students (Departments) - Spring 2010

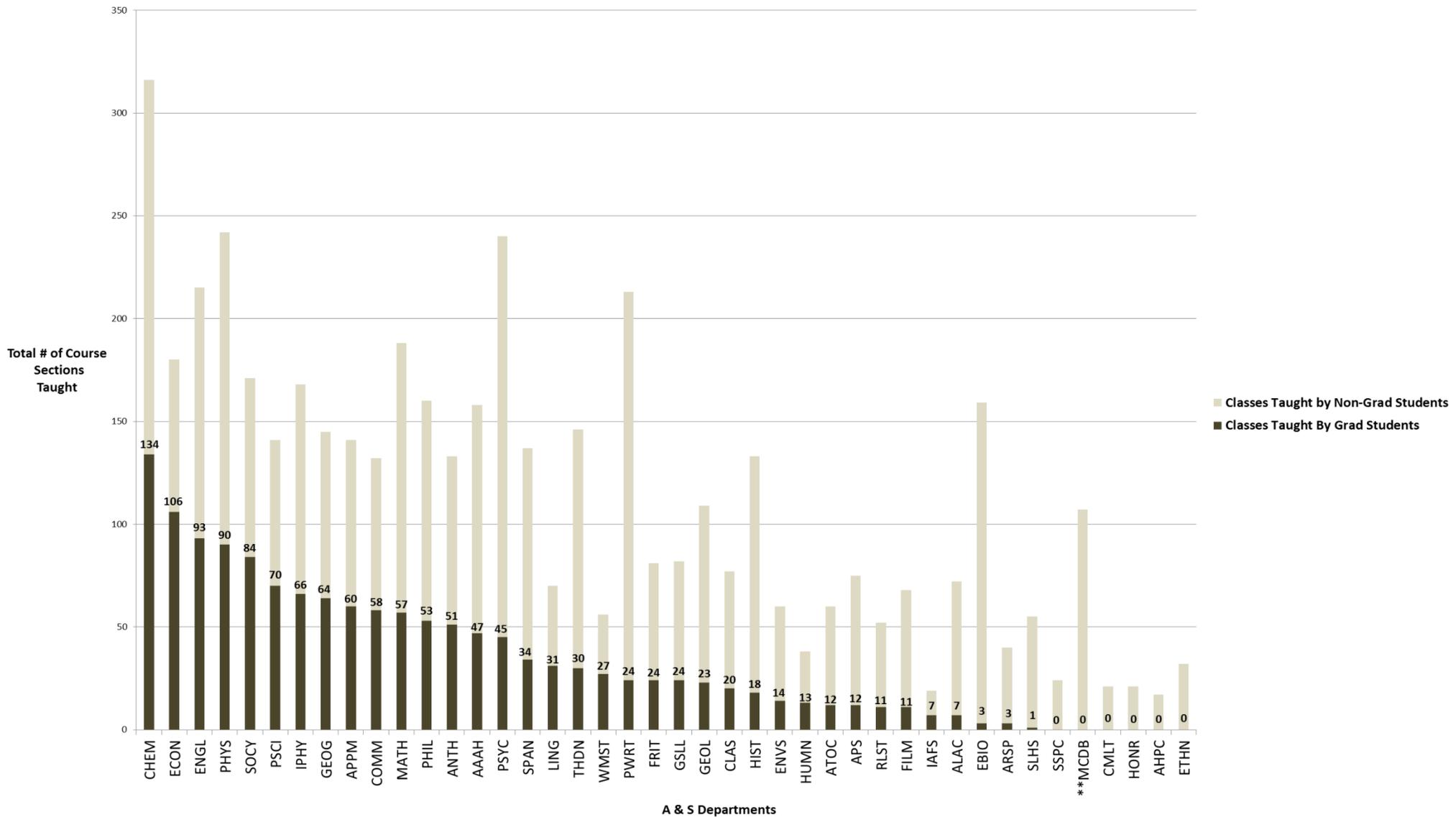


Chart 7

Number of Course Sections Taught by Graduate Students (Departments) - Fall 2010

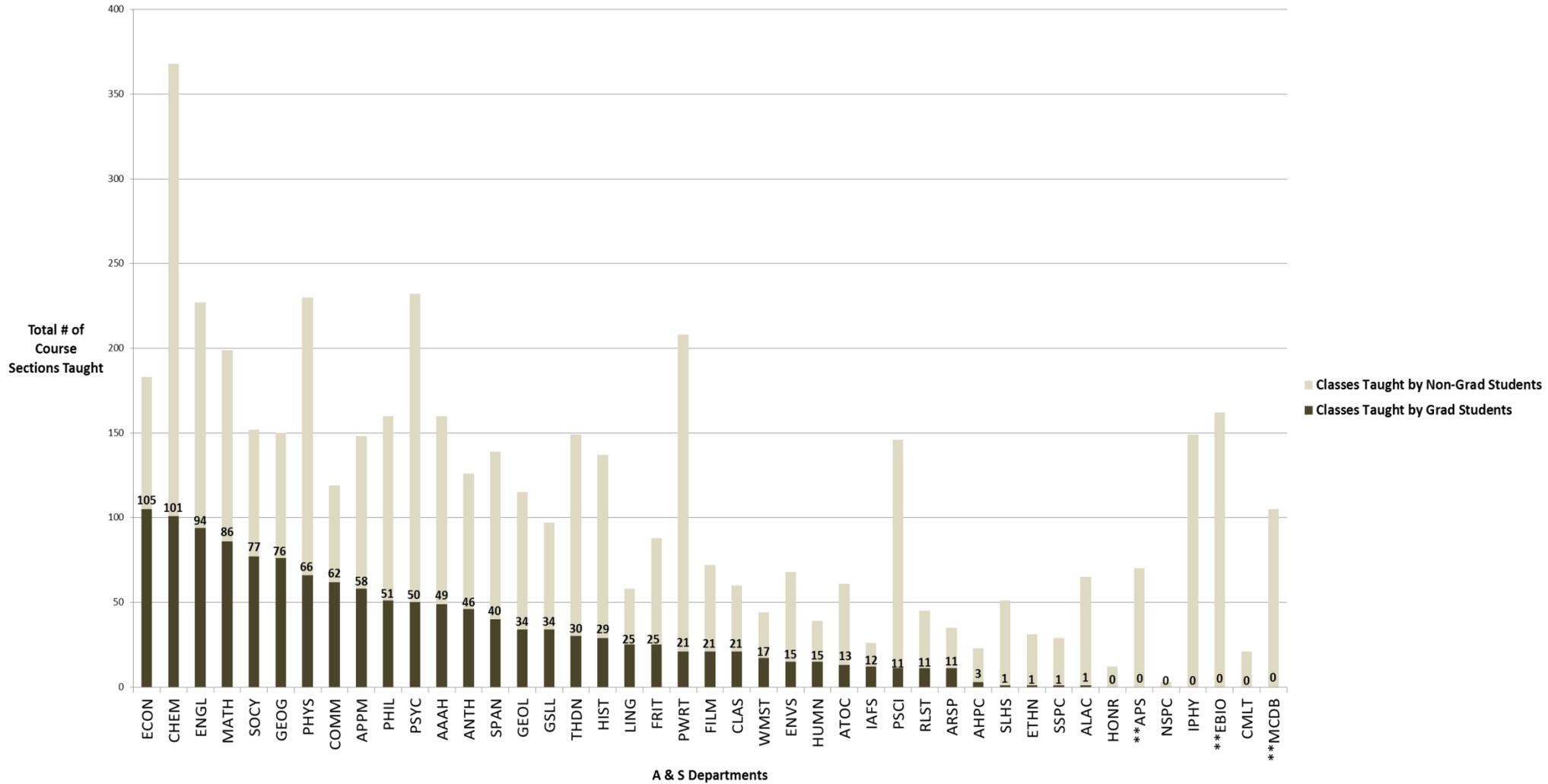


Chart 8

Number of Course Sections Taught by Graduate Students (Departments) - Spring 2011

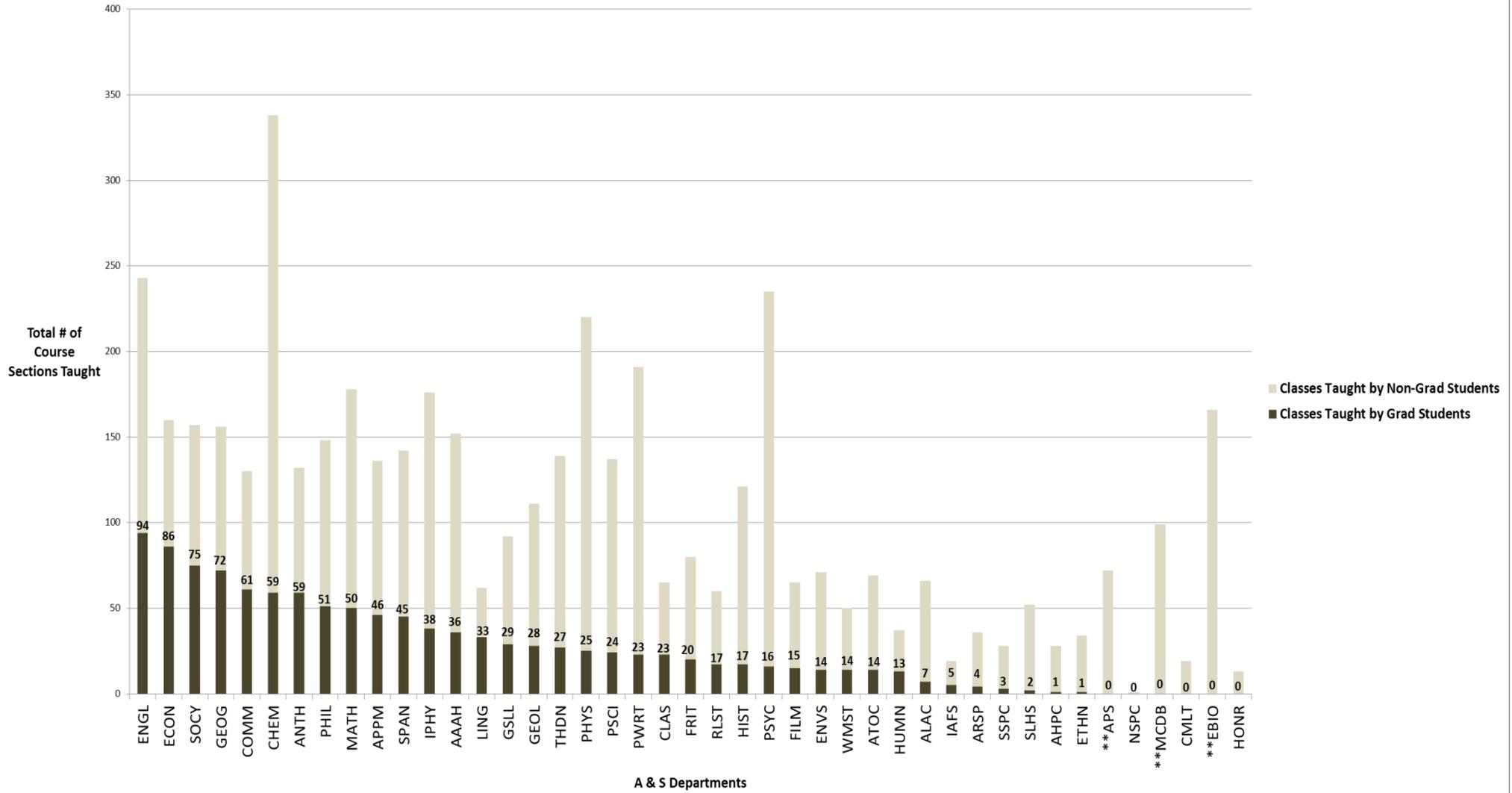


Chart 9

Needs Assessment Design

In Fall 2011, the Assistant Director met with graduate directors and/or staff in 31 departments in the College to gather information about the structure of graduate teaching in each department. Specifically, the Assistant Director asked about: the number of graduate students in each department, how many taught during the academic year and summer terms, how many students were GPTIs versus TAs, the prevalence of both teaching assignments and research assistantships in each department, what types of course sections graduate students taught, and how they were selected to teach specific course sections. Additionally, graduate directors and staff were given an opportunity to provide any other information they felt was relevant for the project. This information was used to help design the questions for the focus groups with graduate students and to direct the conversation in each focus group.

During Spring 2012, ASSETT staff convened focus groups with graduate students in different departments across the College. These focus groups were designed to ascertain how graduate students teach, what needs they feel they have in regards to teaching, their use of technology in teaching, and what graduate students are interested in learning more about with regards to technology in their teaching. Specifically, focus group discussions generally centered around the following questions: participants' specific teaching experiences, the most important things to understand about graduate student teaching in their department, how they utilize technology in their teaching, how they communicate with students outside of class, the challenges they face as graduate student teachers, what resources they would find useful in their teaching, and specific ways they would like to use technology more in their classes. These focus groups generally lasted 30 minutes to an hour, and were held either in the department or at a location convenient for participants. Detailed notes were taken for each focus group. Research assistants Mark Sytsma (Advertising, 2013) and Stephanie Hayden (English and pre-Journalism, 2014) assisted with the note taking and transcription.

Focus Group Respondent Data

A total of 26 focus groups were held from January – April 2012 in the following departments (numbers in brackets indicate the number of participants in each focus group):

<u>Natural Sciences</u>	<u>Social Sciences</u>	<u>Arts and Humanities</u>
Applied Math [6] Astrophysical & Planetary Science [4] Chemistry & Biochemistry – Biochemistry [~12] Ecology and Evolutionary Biology [2] Environmental Studies [5] Geography [7] Geology [~12] Integrated Physiology [1] Mathematics [6] Molecular, Cellular, and Developmental Biology [4] Physics [8]	Anthropology [2] Communication [3] Economics [14] Linguistics [1] Political Science [3] Sociology [4]	Art and Art History – Art History [5] Asian Languages & Civilizations – Japanese Studies [2] Classics [3] Comparative Literature [3] English [3] French & Italian [6] Germanic & Slavic Languages [1] Theater & Dance Theatre [4] Dance [1]

Participants included graduate students at various points in their graduate careers, ranging from first year students to those about to complete their masters or PhD.

Focus Group Results

Graduate Student Teaching

Graduate students interact with undergraduate students in a variety of instructor roles. Graduate students lead lab sections associated with lectures and lab sections that are courses of their own, lead recitation sections, lead entire courses as GPTIs, co-lead courses as GPTIs, lead work groups, and work as graders for course instructors. Those graduate students who teach labs, recitations or courses engage in many different types of teaching activities. Lab instructors lead students through predesigned labs in addition to prepping the labs. Some of these graduate students give short intro lectures before starting with the planned lab activity as well as lead field trips. Labs are generally held in computer labs and in natural science labs. Graduate students who lead recitations or courses give lectures, lead students through discussions on course readings, lead group activities, walk students through exercises and problem sets, review lecture material, administer quizzes, and lead writing exercises. Some graduate students lead performance courses, such as in the Theatre and Dance department. Graduate students must also sometimes provide software instruction, based on the material being learned in the course. Graduate students who lead work groups are present to assist groups as they work through problems. The courses which graduate students lead range in size from roughly 10 students to over 100 students.

There is even greater variability in the autonomy granted to graduate student teachers across the departments of the College and this variability depends on both the department and the course instructor. The autonomy allowed to graduate student teachers ranges from minimal to complete in terms of their

teaching activities. In some cases, all the materials are already designed for the graduate students and they simply walk their students through the materials. In other cases, graduate students are given some guiding materials, but allowed some freedom in how they use the materials. Otherwise, graduate students are allowed to teach as they please, with no guiding materials. Graduate students who lead recitations, and especially labs, tend to have less freedom in their teaching.

The types of teaching that graduate students can engage in during their career at the College depends greatly on the structure and needs of their departments. In smaller departments, there are generally fewer classes which graduate students teach. In some cases, the graduate students all teach the same course. In other departments, graduate students only teach during their first year. Although they might teach in one of several courses, graduate students will have an opportunity to teach in two different courses, at the most. Some departments do not have GPTIs while others, such as Economics or English, employ many GPTIs. Additionally, in larger departments in which graduate students teach beyond the first year, graduate students generally have an opportunity to teach a broader variety of courses.

Departments across the college also offer differing levels of support for graduate students who teach. Some departments offer pedagogy courses during new student orientation or during the first year of a graduate program. Some of the natural science departments employ undergraduate Learning Assistants (LAs) who assist TAs and with course sections in general. Additionally, in some departments graduate students who are teaching the same course (such as in the French and Italian department) will work together to create assessments and other teaching activities.

Technology Use

The core technology tools utilized by graduate student teachers across the College facilitate in-class presentations, in-class multi-media use, grading, and information sharing.

Core tools identified:

- PowerPoint
- YouTube
- CULearn/D2L
- Clickers
- Dropbox
- Music/audio clips
- Online homework Programs (Sapling; Kappa; WebAssign)

Use of these tools is common across the Natural Sciences, Social Sciences, and Arts and Humanities departments. Natural Sciences departments use online homework more than other departments. The Arts and Humanities departments use more multi-media related software. Other issues that arose in departments across the College include: discussion about how effective PowerPoint truly is, the desire to provide alternate methods of presenting material to students, discussion about the best way to use clickers, and the difficulty some participants experienced learning D2L. Some departments had a point person who knew D2L well, which the other students found beneficial.

Beyond the core tools listed above, graduate students teachers employ an unpredictably variable array of equipment and technology tools.

Equipment graduate student teachers identified using:

- Chalkboards
- Whiteboards
- Tablet computers*
- VHS/DVD players
- Overhead projectors
- Lab/Field research equipment
- Portable/in-room LCD projectors

**Very few students who participated in the focus groups use tablet computers, in part due to lack of access to them*

Applications and online tools graduate student teachers identified using:

- Prezi
- Facebook
- Email
- Excel
- Blogs
- Wikis
- Discussion boards
- Google documents
- Skype
- ARTStor
- PhET simulations
- Doodle polls
- Graphing software
- Statistical analysis software
- Film and music editing applications
- Speech analysis software
- Ning (social networking site)
- Yabla (language immersion site)
- iLearn (iPhone/iPad language app)
- Ecology simulation software
- Snap It (video capture tool)
- Mikogo (remote desktop tool)
- Text-based survey tool
- Plagiarism tools (SafeAssign; Turnitin)

Course and University resources that graduate student teachers identified using:

- Course websites
- CU Observatory
- Library eReserves (including streaming video)

Graduate student teachers' use of technology depends upon a fluid combination of departmental, disciplinary, and individual factors. Across the College, departmental and disciplinary factors shape the environments in which individual graduate students make decisions about technology use. However, generalizations across departments about why specific technologies are used by graduate student teachers are difficult because of the ways the explanatory factors combine within each department. Departmental factors include: (1) whether or not departments provide equipment and resources to graduate students, (2) how much instruction graduate students receive from departments about how to use technology in the classroom, (3) the amount of freedom they have to design activities, and (4) the resources available in the classrooms in which they teach. Disciplinary factors include: (1) the overall disciplinary approach to the use of technology and (2) the type of learning activities graduate students lead. Finally, individual factors include: (1) attitudes about using technology in teaching, (2) individual comfort levels with and access to learning new technologies, (3) time constraints on learning new technologies, and (4) time constraints on adapting them for a specific discipline. One student also mentioned that he does not want to show too many tools in the classroom because he doesn't want his students to use them as a crutch and not fully learn the material.

Graduate student teachers generally interact with students outside of class through electronic means, partially as a way to share information and partially due to student preference. When asked how they

communicate with students outside of class, graduate students normally use e-mail to answer questions and accept assignments. Most graduate students will host office hours, although office hours are structured differently across departments. Some departments have a help room which is manned by graduate students while others have their own office hours. However, for those hosting office hours, some undergraduate students prefer to use e-mail over attending office. Additionally, some graduate students will use CULearn/D2L for online quizzes, to post material, and to conduct discussions. A few graduate students tried to use Skype to communicate with students in lieu of office hours, but with very little success. Others have also used course websites, Dropbox, Ning, Mikogo, and Facebook as tools for interacting with their students. In several focus groups, graduate students stated concerns about wanting to maintain boundaries with their students and their reluctance to use some tools because they did not want to invite interactions that might cross those boundaries.

Graduate student teachers vary in their allowance of undergraduate student use of technology, with most graduate student teachers trying to restrict/control it in the classroom. Most prohibit it or only allow laptops for note taking, although a few do actively incorporate and encourage it. In several focus groups, graduate students mentioned the desire to learn more about how to incorporate their students' technology use and also the struggle about where to draw the line about what technology is appropriate to use in the classroom.

Challenges

Graduate students listed many challenges they have encountered, and continue to encounter, in their teaching. These challenges fall into five broad categories:

1. A Lack of Time

Across groups, participants cited not having as much time as desired for teaching, especially in relation to research and coursework requirements. A lack of time can also mean that departmental resources aren't used, because learning them takes time. Lack of time was the most common challenge cited by focus group participants.

Specific challenges include:

- Time management in general
- Time constraints on adapting technology resources for specific disciplinary use (i.e. adding discipline-specific content to PowerPoints for Economics classes)
- Not enough time to cover all their teaching goals in class
- Time constraints on providing adequate feedback on student homework
- Not enough time specifically to learn new technologies

2. A Lack of Autonomy

Having teaching practices determined to some degree by the course instructor/course set-up can also be a challenge, including restrictions on the ability to make decisions about technology use.

Specific challenges include:

- Needing to use/create technology tools according to the lead instructor's schedule in large lecture courses

- Inability to give feedback on homework to students through online homework systems, such as WebAssign
- Reliance on instructors to give TAs access to some tools, such as D2L
- Some instructors have unrealistic goals for technology use and an expectation that graduate students will meet those goals
- Limited input on course design; instructors benefit more from resources because they can design the course
- For students who only teach one year, no way to improve course material and their own teaching beyond the first year
- The structure of lectures taught by lead instructors affects graduate students' teaching activities in recitations
- The amount of support that graduate students receive in their teaching depends upon the course they teach
- Graduate students' teaching experiences are determined in part by how lead instructors view the role of their teaching assistants and the instructor's level of commitment to the course

3. A Lack of Resources

Participants cited lack of access to technology resources as a challenge as well as lack of knowledge about teaching in general and especially about how to use technology to facilitate their teaching. Specific challenges related to lack of resources fell into the following areas:

Lack of knowledge about teaching

- Lack of knowledge about how to teach in general (some participants had previous teaching experience in high school or other forums before teaching as a graduate student, some had no previous teaching experience of any kind)
- In some cases, being assigned to teach classes based on what they need to learn
- When generally assigned to teach different courses each semester, it can be hard to constantly teach new material
- Lack of knowledge about how to assess teaching

Lack of knowledge about how to use technology

- Some graduate students are intimidated by technology in general
- Amount of information available about how to teach and how to use technology in teaching is overwhelming

Lack of equipment

- Some graduate students do not have laptops or access to laptops except through Norlin
- Norlin laptop rentals are restricted to two hour allotments, even for graduate students who teach
- More departments would like to use the ATLAS media labs
- Not all undergraduate students have the same technology available to them – it's hard to use technology with students if they don't all have access to the same resources
- Classrooms vary widely in their technology resources – some only have chalkboards and don't meet all disciplinary needs – many participants cited this is a problem
- Graduate students in disciplines that use scientific notation and equations do not have a good resource for sharing that type of notation electronically

Problems with existing resources

- Campus wireless is sometimes spotty; makes it hard to use streaming video
- Dropbox requires students to register to use it – not all students want to do this
- The storage limit of student email accounts is problematic, especially for those teaching more than one class and because of the amount of time e-mails must be kept from previous classes
- Text constraints and the scrolling required to see all of the information make online homework hard to grade
- Dance graduate students have some unique difficulties with existing equipment – the video equipment they use is very complicated, it's difficult to edit pre-recorded music of concert, and a lot of dance media is only available on VHS
- Clickers are not always intuitive to use and limit the types of questions which can be asked in class
- Multiple systems at CU, and frequent changes to them, can be confusing
- It's difficult to find information about how to download CU licensed software
- In-room projectors vary greatly in their quality and resolution. For disciplines that frequently display detailed graphs, this can be problematic.
- Difficulty figuring out how to e-mail classes through different CU systems
- Lack of knowledge about CU e-mail policies for instructors and how to obtain that information
- Difficulty with learning D2L
- Difficult to work with software across both Mac and PC platforms

4. Student Engagement

Graduate students cited a number of challenges they encountered with student engagement. Most of these challenges center on students' skill sets and participation. Specific challenges related to student engagement fell into the following areas:

Undergraduate student skill sets

- Hard to teach students with different skill sets and backgrounds
- Student writing abilities can be low or students lack course-specific skills
- Students don't always know the software they're required to use for courses (Excel, Matlab, Mathematica) or it's difficult for them to learn and use (ArcGIS)
- For language instructors, poor grammar skills in students' native language make it harder to teach the material
- Students' lack of knowledge about how to do library research or what good academic sources are

Participation

- Challenging to teach students who are unmotivated, too busy to do all the work for the class, or who are overly concerned about grades and/or placement exams
- Some students' preference to e-mail their instructors instead of coming in to office hours
- For dance instructors, it can be difficult to get students to engage both mentally and physically. Additionally, frequent student injuries and lack of knowledge about how to care for them is problematic.
- Students' inappropriate use of cell phones and other equipment
- Difficulty facilitating student-to-student discussions online

- Unrealistic expectations from professors about the amount of work that undergraduates can complete for a course
- Concern about how much the resources required for a course cost students
- Dealing with plagiarism

Relationships

- Lack of respect from undergraduate students
- Maintaining professional relationships with students and acting as a liaison between faculty and undergraduate students

5. Other Challenges

Participants discussed a number of others challenges they have encountered in their teaching at CU.

Specific challenges include:

- Teaching viewed as less meaningful than research in some departments and by some graduate students
- Overall levels of funding
- Grading and interacting with students about grades
- Establishing and maintaining relationships with course faculty, especially those outside graduate students' own department
- Ensuring fidelity of content between different sections of the same course
- Lack of standardizations between different professors who teach the same class, making it difficult to build up resources for TAs
- Difficulty teaching interdisciplinary subjects that require teaching many different topics
- Conducting assessments unique to language classes
- Intellectual Property right concerns about sharing information related to teaching and specific implementations of technology in the classroom

Knowledge Gaps – what graduate student teachers would like to learn more about

Focus group participants cited a number of areas that they would like to learn more about. These areas include:

- **Applications:** Participants specifically cited an interested in learning about SnapIt, turntable, RefWorks, Highlighter, Zapit, Yabla, and Voicethread
- **D2L:** Participants asked for more information about best practices for D2L, general information about how to use D2L, how to separate students into sections, how to set up TAs as the leads for their sections, the D2L maintenance schedule, and how to get stats from D2L.
- **Types of technology:** Participants requested information about online chat tools (for use during and outside class), video chat tools, tools for communicating with faculty and with students, social media, wikis, document cameras, clickers, best practices for clickers, how to integrate media clips into

lectures, how to use clicker data, blogging, lecture capture, online videos outside of YouTube, tools to encourage critical thinking, SMART boards, simulations to use in biochem labs, and authoring software.

- **Technology use in the classroom:** Participants would like to learn more about ways to facilitate feedback from students, how to manage and incorporate student use of technology, how to increase student engagement using technology, facilitating student-to-student information sharing, knowing what technology is available in each classroom, how faculty across CU are using technology in the classroom, how to use available technology, how to share information electronically without overwhelming students, and pedagogical approaches to using technology in the classroom.
- **Other:** Participants also requested information about how to request specific classrooms, copyright laws related to copying videos for class use, how to best secure student grades on computers and options for secure storage, what technology resources are available for instructors, maintaining personal boundaries when using social media, how to encourage educational use of the internet, and how to find information in discipline-specific technology.

Resources Suggested for Supporting Teaching

Focus group participants had many suggestions for resources that would aid them in their teaching. Their suggestions centered on the following areas:

1. Access to specific technology tools, upgraded classroom facilities, and discipline-specific technology

In line with the challenge many graduate students teachers face in terms of lack of resources, many participants suggested specific resources they would find beneficial. These resources include:

Applications

- turntable.fm – free website on which users can share playlists
- Mikogo – remote desktop tool
- Prezi – free alternative program to PowerPoint
- Aplia – online, discipline-specific material including homework, textbook, and course management system
- Final Cut Pro – Apple film editing software
- Voicethread (for use with D2L) – website that allows for online collaboration of multi-media slideshows - CU has a site license
- Music editing software

Classroom facilities

- More chalk for chalkboards
- More chalkboards and/or replace existing chalkboards with whiteboards and SMART boards

- Install more in-room LCD projectors
- Build laptops into classrooms
- HDMI connectors, Mac inputs, and wireless connections for projectors
- Dedicated classrooms for language instruction

Equipment

- Tablets for students to use in the classroom
- Multi-media equipment (ways to record audio and visual data, edit recordings, and easily download recordings)
- Media equipment supplies in general
- Document scanner
- Document camera
- iPads for graduate student teachers to use (rentals and/or a tablet for grad students in each department to share during office hours)
- Headsets with microphones
- DVD burner and scanner
- More labs like ALTEC for language classes
- Mimeboards

CU Services and Systems:

- Be able to view the instructor's class list in mycuinfo
- Ensure that the campus systems are better integrated
- Have apps for CU services and resources
- Be able to download student names with the gradebook in D2L
- Connect streaming videos to D2L
- Additional workshops on D2L
- Add an equation editor to D2L
- Streamlined method of uploading files to D2L
- Create a tool like Google groups for CU email
- Increase the storage space of CULink for instructors
- Help graduate students pay for conversion of VHS to digital at Norlin
- Provide information about how to best assist students with low levels of English proficiency
- CU support for how to develop etextbooks for iPads
- Videos for undergraduate use on how to do library searches

Discipline-specific

- Ways to show 3D images, especially programs to show graphs for multi-variable calculus (Math)
- Ready-made clicker questions
- Tools to facilitate being able to hand-write something (like an equation) and send it electronically

- Lecture capture for lab sections
- An equation editor
- Promotion of existing department resources, such as the dropbox in GSLL
- On-call help with Matlab and Mathematica (Applied Math)
- LaTeX macro
- An online program that facilitates pronunciation practice for language learners
- Applets for course/discipline specific visualizations
- A list of course-specific resources to send to undergraduate students (Applied Math)
- Programs that teach undergraduate students to use MS Word for peer editing
- List of relevant Khan Academy videos

2. Methods for sharing teaching materials both within their departments (for the departments in which this doesn't already exist) and across departments within the College.

Sharing information within departments

- A tool for instructors to save the videos used each semester
- Departmental dropboxes to share materials
- A tool to facilitate sharing of prepared content for courses across a department
- Virtual conference rooms for departments
- Tool to share clicker roster information between TAs and instructors

Sharing information across the College

- A tool to learn who across the campus is using Facebook in their teaching
- Using ALTEC as a way to share knowledge across the language departments
- A college-wide server/archive to share teaching resources
- A tool to facilitate interactions between graduate students across the College
- A way to share the teaching techniques of the Physics faculty across the College
- Ways to collaborate with other instructors

3. Assistance with and promotion of technology use in graduate student teaching

- Providing incentives for keeping up with technology and implementing it in the classroom, such as an award or department competition for best use of technology in the classroom by a graduate student instructor
- Provide course design consulting for technology use in the classroom
- Digitization of overhead transparencies used repeatedly in departments (such as GSLL)
- Assistance designing technology based projects for students
- Access to online instructor materials for textbooks
- Information about easy ways for graduate students to create their own websites
- A course geared towards programming for graduate and undergraduate students
- Better advertising of one-on-one help with using technology in teaching for graduate students
- A resource that provides assistance on how to respond to student emails

- A course on data management and digital media
- Provide information about campus systems to new teachers
- Reference guide and templates about how to use different types of technology in teaching
- A list of best practices for teaching with technology
- Central online location for technology use information
- Resources to aid technology use that are discipline-specific

Concluding Thoughts About Focus Group Results

During the focus groups, graduate student participants provided a wealth of information about their current and past teaching experiences, their current technology use in the classroom, the challenges they have encountered in their teaching, and the resources and information that would be valuable to them in their teaching. Their responses highlighted the variability of teaching experiences graduate students have at CU Boulder and also the disparity in their technology use in the classroom.

Graduate student instructors' greatest challenges center around time constraints, lack of autonomy, lack of resources, and student engagement. Although to some degree graduate students are limited in their teaching, due to lack of autonomy, graduate students would likely benefit from access to additional equipment and technology tools, ways to gather and share information about their teaching, and a single easy-to-access location about how to use technology in teaching, especially with discipline-specific information.

Recommendations For ASSETT Next Steps

The following are recommendations for high impact resources for graduate student teachers:

Resource	Anticipated Timeframe	Campus Partners Needed	Alignment with Other ASSETT projects	ASSETT Resources Required	Considerations
1. Online location with documents to address knowledge gaps about general and discipline - specific technology tools, technology use, and technology use policies.	6-12 months	No	SPARC page	Significant	-Include a way for users to request more information -Create documents based on Knowledge Gaps and Suggested Resources sections of report
2. Graduate student grants for equipment and technology tools (ex. Tablet to write and send notated equations)	1-6 months	Yes	Development awards	Significant	-Site licenses limited to 1 year -Equipment would stay with department
3. Online location for students to share teaching material by discipline and course	6-12 months	Yes	Possible expansion of syllabus archive?	Moderate	-College-wide access -Administrator needed -Archiving should be included
4. Moderated space for students to share teaching information	1-6 months	No	SPARC page	Moderate	-College-wide -Moderator required
5. Award for best graduate student use of technology in the classroom	1-6 months	Yes	SPARC page	Moderate	-Include monetary award -Nominations by undergraduate students
6. Technology use consulting office hours	1-6 months	No	TLC services	Moderate	-Online and in person office hours