PROGRESS THROUGH CALCULUS: CENSUS SURVEY TECHNICAL REPORT

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THE PROGRESS THROUGH CALCULUS PROJECT

This report presents survey findings from the *Progress through Calculus* project, the second in a series of national studies of college calculus overseen by the Mathematical Association of America (MAA) and supported by the National Science Foundation (NSF). The first of these, 2009-2015, was *Characteristics of Successful Programs in College Calculus* (CSPCC, NSF DRL #0910240) which undertook a national survey of Calculus I instruction and conducted multi-day case study visits to 20 colleges and universities with interesting and, in most cases, successful calculus programs. The current project, 2015-2019, is *Progress through Calculus* (PtC, NSF DUE #1430540). This project broadens our study to the entire Precalculus to Calculus II (P2C2) sequence while focusing on cataloging the efforts currently underway to improve student success through this sequence and documenting what does and does not work in the actual implementation of these efforts. The goals of this study are to investigate the following questions:

1. What are the programs and structures of the P2C2 sequence as currently implemented?
    a. What programs and structures are currently in place and how common are they?
    b. What changes to these programs and structures are being implemented in Mathematics departments, either in pilot programs or as large-scale initiatives?
    c. What is the fine-grain structure of these programs and structures in practice?
2. How do characteristics of P2C2 programs relate to student success?
    a. How do departments of Mathematics characterize themselves in terms of implementation of the practices identified in CSPCC as characteristic of successful programs?
    b. What is the relationship between various structural, curricular, and pedagogical decisions (including differing levels of implementation of the practices identified in CSPCC) on student success in P2C2?

Phase I of the project involved a survey of all mathematics departments in the United States that offer a graduate degree (i.e., PhD, MA, MS) in mathematics. Phase II will involve the selection of 12 case study sites to investigate connections between various models (and implementations) for the P2C2 sequence and outcomes that include student persistence and student learning. Details of the CSPCC and PtC projects can be found online at http://www.maa.org/cspcc.

The PtC leadership team includes David Bressoud (Macalester College), Chris Rasmussen (San Diego State University, SDSU), Jessica Ellis (Colorado State University), Sean Larsen (Portland State University, PSU), Doug Ensley (Mathematics Association of America; replacing Linda Braddy), and Estrella Johnson (Virginia Tech). This document was prepared by graduate research assistants, Naneh Apkarian (SDSU) and Dana Kirin (PSU). Other contributing graduate students include Matt Voigt (SDSU) and Kristen Vroom (PSU). The GTA section of the census survey was developed in collaboration with researchers associated with the *Improving the Preparation of Graduate Students to Teach Undergraduate Mathematics* project (NSF DUE #1432381).

UNDERSTANDING THIS REPORT

This document contains an overview of the results from the census survey. We are pleased to report that many institutions participated in our survey, which was distributed to every university department in the United States that offers a graduate degree in mathematics. Overall we had a 67.6% response rate (223/330), representing 75% (134/178) of the PhD-granting departments and 59% (89/152) of the MA/MS-granting departments that we contacted. For ease of reporting, throughout this document "MA" is used to designate institutions whose highest mathematics degree is a master's degree, be it an MA or an MS.

In reading this report, it may be useful to understand how the survey was administered. A list of all departments which offer a graduate degree in mathematics was compiled from national databases, and a web search identified their respective chairs. In early 2015, pre-incentive was offered to all these chairs, followed by an invitation to participate in the census survey. They were asked to fill out the survey themselves, or to pass it on to someone else in their department with the requisite knowledge to do so. The survey was designed so that it could be passed from person to person if, for example, it made sense for those in charge of various programs to fill out the related sections. While this increases the reliability of responses, it reduces our knowledge of who exactly responded. The survey was closed in the summer of 2015.

Naturally, the raw survey data were unfit for analysis, even such basic analysis as is presented in this technical report. The data cleaning used to increase the reliability of results was simple, but important. Individual responses were examined to remove or merge duplicate entries as appropriate and to exclude responses from departments which no longer offer graduate degrees. Each course reported in the survey was checked to ensure that it had the correct course level designation (i.e., preparation for calculus, first calculus, or further calculus) and that it was in fact a *mainstream* P2C2 course. Individual entries were inspected to ensure they were in appropriate formats (e.g., "3" instead of "three" when numeric data were needed) and in the correct cells (e.g., that capita enrollment and number of sections were not switched). In the case of participants marking "other" and explaining their response, these were checked for validity. In some cases, participants used that space to clarify or comment on their response (e.g., "Other: we use Stewart's text" when asked if the textbook is uniform across sections); these responses were saved but the item was recoded to indicate that it was not a literal "other" option. When confusion arose, course websites were consulted for verification.

This report is organized into three main parts. The first deals with survey questions related to the nature of P2C2 programs across the country and their implementation. The second deals with specific details of courses in the P2C2 sequence, covering selected topics expected to be of widespread interest. A third section discusses variations in course structure. The sections of this report are organized for clarity of reporting and do not exactly match the order in which questions were answered by participants. In addition, the survey was adaptive, meaning that not everyone saw every question. For example, if an institution indicated that they do not have a teaching preparation program for graduate teaching assistants (GTAs), they were not asked about the details of such a program. Identifying questions, as well as some which were used to funnel participants through adaptations, have been omitted from this report, as have open-ended questions which gathered prosaic responses. Analysis of those open-ended questions will be undertaken in future work.

PART I: PROGRAMMATIC OVERVIEW

The first section of the survey reported on here considered the structures and programs surrounding the P2C2 sequence. This included questions about how students are placed into their first course in the sequence, resources available to support students taking these introductory courses, the collection and review of local data to monitor the existing program, GTAs involvement and training, and the department's priorities with regard to their implementation of key features of their program. These themes were included in the PtC survey because they were identified as important elements of successful Calculus I programs in the CSPCC study. Project details and further reading on the results of the CSPCC project are available in the form of an MAA Notes volume available online at http://www.maa.org/cspcc.

Part I of this report consists of survey questions in their original wording and the responses of participating institutions. Responses are reported by institution type (PhD vs. MA) as well as in the aggregate. 223 departments contributed data for this section; 134 of these offer a doctorate in mathematics degree and the other 89 offer a master's as their highest mathematics degree. As you read through the data in this section of the report, please note that the *N*-size reported for each question reflects the ***number of institutions that responded to that question***. Thus, proportions in this section should be read as "0.789 of the institutions who answered this question reported that students who do not meet the placement requirements are prevented from enrolling in the courses they wish to take". In each table of values, the *N* is indicated in parentheses besides each column heading (e.g., "All (218)"). Within each table the value is reported both with a count and a proportion in parentheses (e.g., "41 (0.188)").

PLACEMENT

How are entering students placed into the precalculus/calculus sequence? Mark all that apply.

	All (219)	PhD (134)	MA (85)
Placement exams developed by the department	104 (0.475)	80 (0.597)	24 (0.282)
Placement exams created by the state	16 (0.073)	2 (0.015)	14 (0.165)
ACT or SAT scores	116 (0.530)	60 (0.448)	56 (0.659)
Accuplacer	21 (0.096)	6 (0.045)	15 (0.176)
Compass	24 (0.110)	10 (0.075)	14 (0.165)
ALEKS	51 (0.233)	37 (0.276)	14 (0.165)
MAA placement exam	11 (0.050)	6 (0.045)	5 (0.059)
High school grades	37 (0.169)	10 (0.075)	27 (0.318)
AP exam results	155 (0.708)	96 (0.716)	59 (0.694)
Individual advising	74 (0.338)	44 (0.328)	30 (0.353)
Other	39 (0.178)	22 (0.164)	17 (0.200)

Is it usually the case that students who do not meet the placement requirements are prevented from enrolling in the class they wish to take?

	All (219)	PhD (133)	MA (86)
Yes	176 (0.804)	103 (0.774)	73 (0.849)
No	43 (0.196)	30 (0.226)	13 (0.151)

Other than ad hoc advising, does your department have a process in place to revisit and, as necessary, adjust student placement after the term has begins?

	All (219)	PhD (133)	MA (86)
Yes	56 (0.256)	36 (0.271)	20 (0.233)
No	163 (0.744)	97 (0.729)	66 (0.767)

Is the department generally satisfied with the effectiveness of the placement procedures for the precalculus/calculus sequence?

	All (218)	PhD (133)	MA (85)
Yes	112 (0.516)	68 (0.515)	44 (0.518)
Procedures are adequate, but could be improved	85 (0.392)	55 (0.417)	30 (0.353)
No	20 (0.092)	9 (0.068)	11 (0.129)

What best characterizes the current status of your placement procedures? Mark all that apply.

	All (218)	PhD (133)	MA (85)
No significant changes are planned	106 (0.486)	67 (0.504)	39 (0.459)
Changes have recently/currently being implemented	67 (0.307)	42 (0.320)	25 (0.294)
Possible changes are being discussed	64 (0.294)	36 (0.270)	28 (0.329)

RESOURCES FOR STUDENT SUPPORT

Is there a university-wide tutoring center available to students enrolled in the precalculus/calculus sequence?

	All (218)	PhD (133)	MA (85)
No	41 (0.188)	28 (0.211)	13 (0.153)
Yes – for any course	95 (0.436)	62 (0.466)	33 (0.388)
Yes – specifically for mathematics courses	82 (0.376)	43 (0.323)	39 (0.459)

Is there a department-run tutoring center available to students enrolled in the precalculus/calculus sequence?

	All (219)	PhD (134)	MA (85)
No	49 (0.224)	25 (0.187)	24 (0.282)
Yes – for any mathematics course	92 (0.420)	55 (0.410)	37 (0.435)
Yes – specifically for P2C2 courses	78 (0.356)	54 (0.403)	24 (0.282)

Which of the following **other** supports are offered for students in the precalculus/calculus sequence? Mark all that apply.

	All (223)	PhD (134)	MA (89)
Space in the math building for students to gather	125 (0.561)	75 (0.560)	50 (0.562)
P2C2 study groups arranged outside the department	46 (0.206)	30 (0.224)	16 (0.180)
Resources specifically for "at-risk" groups	71 (0.318)	44 (0.328)	27 (0.303)
Optional supplemental instruction	86 (0.386)	53 (0.396)	33 (0.371)
Practice exams	74 (0.332)	62 (0.463)	12 (0.135)
Online tutoring	24 (0.108)	12 (0.090)	12 (0.135)
Online resources for content review	82 (0.368)	51 (0.381)	31 (0.348)
Other	25 (0.112)	16 (0.119)	9 (0.101)
No response	23 (0.103)	11 (0.082)	12 (0.135)

In what roles are undergraduates hired to assist with the delivery of precalculus/calculus courses? Mark all that apply.

	All (217)	PhD (133)	MA (84)
Graders	117 (0.539)	72 (0.541)	45 (0.536)
Tutors	174 (0.802)	99 (0.744)	75 (0.893)
Recitation leaders	44 (0.203)	32 (0.241)	12 (0.143)
Leaders of review sessions	32 (0.147)	22 (0.165)	10 (0.119)
Leaders of supplemental instruction	68 (0.313)	38 (0.286)	30 (0.357)
Other	16 (0.074)	7 (0.053)	9 (0.107)
Not hired	17 (0.078)	13 (0.098)	4 (0.048)

*Note: The following **three** questions were only visible if the participant indicated the presence of a department-run tutoring center.*

Which of the following services are available to through the **department-run** tutoring center? Mark all that apply.

	All (169)	PhD (108)	MA (61)
Computer-aided instruction	48 (0.284)	24 (0.222)	24 (0.393)
Organized small group tutoring or study sessions	52 (0.308)	30 (0.278)	22 (0.361)
Tutoring by undergraduate students	135 (0.799)	77 (0.713)	58 (0.951)
Tutoring by graduate students	144 (0.852)	96 (0.889)	48 (0.787)
Tutoring by mathematics faculty	46 (0.272)	25 (0.231)	21 (0.344)
Maple, Mathematica, or Matlab (or equivalent)	40 (0.237)	19 (0.176)	21 (0.344)
Review sessions	51 (0.302)	36 (0.333)	15 (0.246)
Other	5 (0.030)	3 (0.028)	2 (0.033)

Is your department generally satisfied with the **department-run** tutoring center?

	All (169)	PhD (108)	MA (61)
Yes	105 (0.621)	67 (0.620)	38 (0.623)
The center is adequate, but could be improved	62 (0.367)	41 (0.380)	21 (0.344)
No	2 (0.012)	0 (0.000)	2 (0.033)

What best characterizes the current status of your **department-run** tutoring center? Mark all that apply.

	All (167)	PhD (109)	MA (61)
No significant changes are planned	116 (0.695)	75 (0.701)	41 (0.683)
Changes have recently/currently being implemented	26 (0.156)	19 (0.178)	7 (0.117)
Possible changes are being discussed	29 (0.174)	17 (0.159)	12 (0.200)

Note: The following two questions were only visible if the participant indicated the presence of a university-wide tutoring center and the absence of a department-run tutoring center.

Is your department generally satisfied with the **university-wide** tutoring center?

	All (45)	PhD (22)	MA (23)
Yes	19 (0.422)	12 (0.545)	7 (0.304)
The center is adequate, but could be improved	20 (0.444)	9 (0.409)	11 (0.478)
No	6 (0.133)	1 (0.045)	5 (0.217)

What best characterizes the current status of your **university-run** tutoring center? Mark all that apply.

	All (47)	PhD (23)	MA (24)
No significant changes are planned	32 (0.681)	17 (0.739)	15 (0.625)
Changes have recently/currently being implemented	8 (0.170)	3 (0.130)	5 (0.208)
Possible changes are being discussed	8 (0.170)	4 (0.174)	4 (0.167)

THE USE OF LOCAL DATA

Does your department have access to data to help inform decisions about your undergraduate program?

	All (215)	PhD (131)	MA (84)
No	10 (0.047)	6 (0.046)	4 (0.048)
Yes, but not readily available	107 (0.498)	63 (0.481)	44 (0.524)
Yes, readily available	98 (0.456)	62 (0.473)	36 (0.429)

*Note: The following question was only visible if the participants indicated they **do** have access to data.*

Which types of data does your department review on a regular basis to inform decisions about your undergraduate program? Mark all that apply.

	All (202)	PhD (123)	MA (79)
Adherence to placement recommendations	87 (0.431)	55 (0.447)	32 (0.405)
Correlation with previous performance	94 (0.465)	60 (0.488)	34 (0.430)
Student performance (e.g., grades)	178 (0.881)	110 (0.894)	68 (0.861)
Student persistence onto the next course	82 (0.406)	50 (0.407)	32 (0.405)
Student evaluations	167 (0.827)	107 (0.870)	60 (0.759)
Student exit interviews	36 (0.178)	23 (0.187)	13 (0.165)
Communication with client disciplines	93 (0.460)	61 (0.496)	32 (0.405)
Other	18 (0.089)	11 (0.089)	7 (0.089)

Is your department generally satisfied with its use of local data (i.e., data collection and review)?

	All (214)	PhD (130)	MA (84)
Yes	95 (0.444)	62 (0.477)	33 (0.393)
Use is adequate, but could be improved	84 (0.393)	47 (0.362)	37 (0.440)
No	35 (0.164)	21 (0.162)	14 (0.167)

What best characterizes the current status of use of local data? Mark all that apply.

	All (213)	PhD (130)	MA (83)
No significant changes are planned	136 (0.638)	83 (0.638)	53 (0.639)
Changes have recently/currently being implemented	40 (0.188)	27 (0.208)	13 (0.157)
Possible changes are being discussed	43 (0.202)	23 (0.177)	20 (0.241)

GTAS IN THE P2C2 SEQUENCE

Is there a **university-wide** GTA teaching preparation program?

	All (213)	PhD (128)	MA (85)
Yes, required	57 (0.268)	45 (0.352)	12 (0.141)
Yes, strongly recommended	25 (0.117)	19 (0.148)	6 (0.071)
Yes, not strongly recommended	20 (0.094)	18 (0.141)	2 (0.024)
No	111 (0.521)	46 (0.359)	65 (0.765)

Is there a required, **department-specific** GTA teaching preparation program?

	All (215)	PhD (130)	MA (85)
Yes	148 (0.688)	108 (0.831)	40 (0.471)
No	67 (0.312)	22 (0.169)	45 (0.529)

Note: The following eleven questions were only visible if the participants indicated that there is a required, department-specific GTA preparation program.

Who is the primary audience for your department's GTA teaching preparation program? Mark all that apply.

	All (148)	PhD (108)	MA (40)
Graders	45 (0.304)	35 (0.324)	10 (0.250)
Tutors	52 (0.351)	36 (0.333)	16 (0.400)
Recitation leaders	103 (0.696)	88 (0.815)	15 (0.375)
Primary instructors	120 (0.811)	85 (0.787)	35 (0.875)
In-class instructional assistants	54 (0.365)	39 (0.361)	15 (0.375)

How many of your GTAs participate in the department's teaching preparation program?

	All (148)	PhD (108)	MA (40)
All	118 (0.797)	88 (0.815)	30 (0.750)
Most	24 (0.162)	19 (0.176)	5 (0.059)
Less than half	4 (0.027)	1 (0.009)	3 (0.035)
Just a few	2 (0.014)	0 (0.000)	2 (0.024)

When do GTAs participate in the department's teaching preparation program? Mark all that apply.

	All (148)	PhD (108)	MA (40)
Before teaching for the first time	129 (0.872)	95 (0.880)	34 (0.850)
During their first teaching term	78 (0.527)	57 (0.528)	21 (0.525)
During their second teaching term	29 (0.196)	21 (0.194)	8 (0.200)
At some other point (e.g., ongoing seminar)	29 (0.196)	18 (0.167)	11 (0.275)
Other	1 (0.007)	1 (0.009)	0 (0.000)

Which of the following best describes the format of your main activity in the GTA teaching preparation program? Mark all that apply.

	All (147)	PhD (108)	MA (39)
Short workshop/orientation	41 (0.279)	27 (0.250)	14 (0.359)
One day workshop	22 (0.150)	14 (0.130)	8 (0.205)
Multi-day workshop	48 (0.327)	38 (0.352)	10 (0.256)
Term-long course or seminar	84 (0.571)	67 (0.620)	17 (0.436)
Occasional seminars or workshops	23 (0.156)	18 (0.167)	5 (0.128)
Other	15 (0.102)	11 (0.102)	4 (0.103)

Which of the following activities, related to **providing feedback** on GTA's teaching, does your program formally include? Mark all that apply.

	All (156)	PhD (112)	MA (44)
GTAs practice teaching and receiving feedback on their teaching	105 (0.673)	83 (0.741)	22 (0.500)
GTAs are observed by an experienced instructor while teaching in the classroom and receive feedback on their teaching	117 (0.750)	85 (0.759)	32 (0.727)
New GTAs are observed by an experienced instructor while teaching in the classroom and receive feedback on their teaching	41 (0.263)	37 (0.330)	4 (0.091)
New GTAs teaching in the classroom are videotaped for review and discussion with a mentor or experienced instructor	22 (0.141)	22 (0.196)	0 (0.000)
GTAs are paired with a mentor to discuss teaching	56 (0.359)	39 (0.348)	17 (0.386)
Other	11 (0.071)	8 (0.071)	3 (0.068)
No response	12 (0.077)	6 (0.054)	6 (0.136)

Which of the following activities, related to **evaluating** GTAs' teaching, does your program formally include? Mark all that apply.

	All (156)	PhD (112)	MA (44)
Faculty observations	116 (0.744)	83 (0.741)	33 (0.750)
Student evaluations required by the university/department	136 (0.872)	101 (0.902)	35 (0.795)
Student evaluations separate from the required student evaluations	35 (0.224)	28 (0.250)	7 (0.159)
Other	5 (0.032)	3 (0.027)	2 (0.045)
No response	12 (0.077)	6 (0.054)	6 (0.136)

Which of the following other activities does your program formally include? Mark all that apply.

	All (156)	PhD (112)	MA (44)
Watching/reading cases of other's teaching	53 (0.340)	37 (0.330)	16 (0.364)
Observing experienced GTAs in the classroom	22 (0.141)	19 (0.170)	3 (0.068)
Developing lesson plans	64 (0.410)	48 (0.429)	16 (0.364)
Learning about classroom assessment methods	62 (0.397)	45 (0.402)	17 (0.386)
Learning research about student learning of mathematics	35 (0.224)	28 (0.250)	7 (0.159)
Other	11 (0.071)	9 (0.080)	2 (0.045)
No response	54 (0.346)	36 (0.321)	18 (0.409)

What best describes the source of instructional materials and activities used in your teaching preparation program? Mark all that apply.

	All (155)	PhD (111)	MA (44)
Materials created by the people who provide teaching preparation	129 (0.832)	97 (0.874)	32 (0.727)
Published materials	59 (0.381)	45 (0.405)	14 (0.318)
Materials adopted from another institution's program	15 (0.097)	10 (0.090)	5 (0.114)
Other	6 (0.039)	4 (0.036)	2 (0.045)

Who is responsible for facilitating the teaching preparation program? Mark all that apply.

	All (146)	PhD (108)	MA (38)
Experienced graduate students	27 (0.185)	26 (0.241)	1 (0.026)
One or more individuals for whom this is a multi-year assignment	123 (0.842)	88 (0.815)	35 (0.921)
One or more individuals for whom this is a single-year assignment	22 (0.151)	20 (0.185)	2 (0.053)
Department committee	24 (0.164)	18 (0.167)	6 (0.158)
Other	0 (0.000)	0 (0.000)	0 (0.000)

How well does your teaching preparation program prepare new GTAs for their roles in the precalculus/calculus sequence?

	All (140)	PhD (106)	MA (34)
Very well	30 (0.214)	20 (0.189)	10 (0.294)
Well	55 (0.393)	44 (0.415)	11 (0.324)
Adequately	54 (0.386)	41 (0.387)	13 (0.382)
Poorly	0 (0.000)	0 (0.000)	0 (0.000)
Very poorly	1 (0.007)	1 (0.009)	0 (0.000)

What resources would be most helpful to you in strengthening your GTA teaching preparation program, if desired? Mark all that apply.

	All (156)	PhD (112)	MA (44)
Online library of tested resources	58 (0.372)	44 (0.393)	14 (0.318)
Research-based information about best practices	93 (0.596)	67 (0.598)	26 (0.591)
Tools for evaluating effectiveness of program	77 (0.494)	61 (0.545)	16 (0.364)
Professional development for teaching staff	66 (0.423)	46 (0.411)	20 (0.455)
Collegial network for teaching preparation staff	75 (0.481)	55 (0.491)	20 (0.455)
Other	11 (0.071)	7 (0.063)	4 (0.091)
No response	27 (0.173)	19 (0.170)	8 (0.182)

Note: The following question was only visible if the participants indicated the presence of either a university-wide or department-specific GTA teaching preparation program.

Is the department generally satisfied with the effectiveness of the GTA teaching preparation programs currently in place?

	All (160)	PhD (118)	MA (42)
Yes	107 (0.669)	75 (0.636)	32 (0.762)
The programs are adequate, but could be improved	48 (0.300)	38 (0.322)	10 (0.238)
No	5 (0.031)	5 (0.042)	0 (0.000)

Note: The following question was visible to all participants.

What best characterizes the current status of your GTA teaching preparation programs? Mark all that apply.

	All (210)	PhD (130)	MA (80)
No significant changes are planned	144 (0.686)	86 (0.662)	58 (0.725)
Changes have recently/currently being implemented	42 (0.200)	28 (0.215)	14 (0.175)
Possible changes are being discussed	28 (0.133)	19 (0.146)	9 (0.113)

PRIORITIES

A major result of the CSPCC project was the identification of eight features of successful Calculus I programs:

1. Rigorous courses that challenge and engage students
2a. Uniform course components (e.g., common exams, common textbook)
2b. Regular meetings of instructors
3. The collection and use of local data to monitor elements program and identify areas for improvement
4. Procedures for placing students into the appropriate first course in the P2C2 sequence
5. Robust teaching preparation programs for graduate teaching assistants
6. The presence of resources to support students (including tutoring centers)
7. Usage of student-centered pedagogies (e.g., active learning) in class

In line with our research question 2a, participants were asked to characterize themselves in terms of their success at implementing each of these features, after identifying how important they believe each to be. Due to the number of response options, counts and proportions are presented in separate tables.

How **important** are the following characteristics to having a successful precalculus/calculus sequence?

	All (219)			PhD (132)			MA (87)		
Features	Very	Some what	Not	Very	Some what	Not	Very	Some what	Not
Challenging courses	99	108	12	56	71	5	43	37	7
Uniform components	121	84	14	77	46	9	44	38	5
Instructor meetings	60	121	47	43	63	26	17	49	21
Monitoring local data	87	115	17	54	66	12	33	49	5
Student placement	190	26	3	111	18	3	79	8	0
GTA preparation	110	69	40	86	43	3	24	26	37
Student support programs	147	72	0	85	47	0	62	25	0
Active learning	97	102	20	55	61	16	42	41	4

	All (219)			PhD (132)			MA (87)		
Features	Very	Some what	Not	Very	Some what	Not	Very	Some what	Not
Challenging courses	0.452	0.493	0.055	0.424	0.538	0.038	0.494	0.425	0.080
Uniform components	0.553	0.384	0.064	0.583	0.348	0.068	0.506	0.437	0.057
Instructor meetings	0.274	0.511	0.215	0.326	0.477	0.197	0.195	0.563	0.241
Monitoring local data	0.397	0.525	0.078	0.409	0.500	0.091	0.379	0.563	0.057
Student placement	0.868	0.119	0.014	0.841	0.136	0.023	0.908	0.092	0.000
GTA preparation	0.502	0.315	0.183	0.652	0.326	0.023	0.276	0.299	0.425
Student support programs	0.671	0.329	0.000	0.644	0.356	0.000	0.713	0.287	0.000
Active learning	0.443	0.466	0.091	0.417	0.462	0.121	0.483	0.471	0.046

How **successful** is your program with each of these characteristics?

Note: If participants indicated that a feature was not applicable to them, they were not included in that feature's totals for success.

	All				PhD				MA			
Features	*N*	Very	Some what	Not	*N*	Very	Some what	Not	*N*	Very	Some what	Not
Challenging courses	**214**	91	110	13	**130**	53	66	11	**84**	38	44	2
Uniform components	**210**	131	74	5	**127**	89	36	2	**83**	42	38	3
Instructor meetings	**195**	42	98	55	**119**	33	57	29	**76**	9	41	26
Monitoring local data	**212**	38	127	47	**128**	24	77	27	**84**	14	50	20
Student placement	**215**	83	126	6	**129**	49	78	2	**86**	34	48	4
GTA preparation	**185**	63	93	29	**127**	46	67	14	**58**	17	26	15
Student support programs	**216**	91	120	5	**130**	52	75	3	**86**	39	45	2
Active learning	**199**	30	133	36	**117**	15	77	25	**82**	15	56	11

	All				PhD				MA			
Features	*N*	Very	Some what	Not	*N*	Very	Some what	Not	*N*	Very	Some what	Not
Challenging courses	**214**	0.425	0.514	0.061	**130**	0.408	0.508	0.085	**84**	0.452	0.524	0.024
Uniform components	**210**	0.624	0.352	0.024	**127**	0.701	0.283	0.016	**83**	0.506	0.458	0.036
Instructor meetings	**195**	0.215	0.503	0.282	**119**	0.277	0.479	0.244	**76**	0.118	0.539	0.342
Monitoring local data	**212**	0.179	0.599	0.222	**128**	0.188	0.602	0.211	**84**	0.167	0.595	0.238
Student placement	**215**	0.386	0.586	0.028	**129**	0.280	0.605	0.016	**86**	0.395	0.558	0.047
GTA preparation	**185**	0.341	0.503	0.157	**127**	0.362	0.528	0.110	**58**	0.293	0.448	0.259
Student support programs	**216**	0.421	0.556	0.023	**130**	0.400	0.577	0.023	**86**	0.453	0.523	0.023
Active learning	**199**	0.151	0.668	0.181	**117**	0.128	0.658	0.214	**82**	0.183	0.683	0.134

PART II: DETAILED COURSE DATA

As part of the survey, participating departments were asked to identify and list all mainstream courses in place in their P2C2 sequence, as well as to provide detailed information about each of these courses (e.g., enrollment data, details about course delivery, information about coordinated aspects of the course). Part II of this report provides an overview of these responses of participating departments. The table below shows the number of courses for which details were provided, broken down by PhD/MA as well as course level.

	All		PhD		MA	
	Departments	Courses	Departments	Courses	Departments	Courses
Total P2C2	205	890	125	575	80	315
Precalculus	177	262	103	152	74	110
Calculus 1	197	327	121	218	76	109
Calculus 2	195	301	119	205	76	96

The data in this section has been separated into three sections. All preparation for calculus course responses are in the first section; first courses in calculus responses are in the second; and further single-variable calculus course responses are in the third. As you read through the data in this section of the report, please note that the *N*-size reported for each question reflects the ***number of courses with information provided for that question***. Thus, proportions in this section should be read as "0.344 of the precalculus courses with information provided for this question are never taught by a tenured or tenured track faculty member". As with the previous section, in each table of values, the *N* is indicated in parentheses besides each column heading (e.g., "All (247)"). Within each table the value is reported both with a count and a proportion in parentheses (e.g., "85 (0.344)").

PRECALCULUS & EQUIVALENTS

Participants were asked to include information about courses which function as final courses in preparation for single-variable calculus. As detailed in Part III of this report, there were variations among these courses' structure, but here they are all lumped together. In particular, this means that single-course pre-calculus responses are lumped together with college algebra/trigonometry paired courses, all of which are here referred to collectively as precalculus or PC.

177 departments provided detailed information for 262 courses that function as direct preparation for single variable calculus, with 103 PhD-granting departments reporting on 152 courses and 74 MA-granting departments reporting on 110 courses.

Total enrollment in preparation for precalculus courses by term. Note that "Term 3" is applicable mainly to schools on the quarter system, hence the drop-off in enrollment is not quite as severe as it seems.

	All (247)	PhD (146)	MA (108)
Academic year	141,743	89,045	52,698
Term 1	86,289	55,416	30,873
Term 2	53,436	32,150	21,286
Term 3	2,018	1,479	543
All Summer	9,439	5,822	3,617

Total contact hours (lecture plus lab/recitation) averaged across all preparation for calculus courses:

	All (250)	PhD (142)	MA (108)
Mean	3.69 hours	3.72 hours	3.65 hours
Standard deviation	0.93 hours	0.98 hours	0.85 hours

What is the typical DFW (drop/fail/withdraw) rate for this course?

	All (232)	PhD (134)	MA (98)
Mean	27.36 %	27.09 %	27.73 %
Standard deviation	11.96 %	11.03 %	13.19 %

How often is precalculus taught by a **tenured or tenured track** faculty?

	All (247)	PhD (141)	MA (106)
Never	85 (0.344)	71 (0.504)	14 (0.132)
Rarely	100 (0.405)	54 (0.383)	46 (0.434)
Frequently	62 (0.251)	16 (0.113)	46 (0.434)

How often is precalculus taught by a **full-time teaching** faculty?

	All (242)	PhD (139)	MA (103)
Never	30 (0.124)	25 (0.180)	5 (0.049)
Rarely	34 (0.140)	17 (0.122)	17 (0.165)
Frequently	178 (0.736)	97 (0.698)	81 (0.786)

How often is precalculus taught by a **part-time teaching faculty, visiting faculty, or postdoctoral researcher**?

	All (240)	PhD (135)	MA (105)
Never	55 (0.229)	39 (0.289)	16 (0.152)
Rarely	73 (0.304)	42 (0.311)	31 (0.295)
Frequently	112 (0.467)	54 (0.400)	58 (0.552)

How often is precalculus taught by **graduate teaching assistants (GTAs)**?

	All (239)	PhD (139)	MA (100)
Never	94 (0.393)	28 (0.201)	66 (0.660)
Rarely	47 (0.197)	31 (0.223)	16 (0.160)
Frequently	98 (0.410)	80 (0.576)	18 (0.180)

How often is precalculus taught by **other titles not listed above**?

	All (27)	PhD (15)	MA (12)
Never	17 (0.630)	5 (0.333)	12 (1.000)
Rarely	0 (0.000)	0 (0.000)	0 (0.000)
Frequently	10 (0.370)	10 (0.667)	0 (0.000)

What is the primary instructional format during the regular class meeting (not recitation sections)?

	All (256)	PhD (149)	MA (107)
Lecture and answering student questions	150 (0.586)	87 (0.584)	63 (0.589)
Lecture incorporating some active learning techniques	47 (0.184)	28 (0.188)	19 (0.178)
Minimal lecture with mainly active learning techniques	10 (0.039)	9 (0.060)	1 (0.009)
Lecture plus computer based instruction	16 (0.063)	6 (0.040)	10 (0.093)
There is too much variation	19 (0.074)	7 (0.047)	12 (0.112)
Other	14 (0.055)	12 (0.081)	2 (0.019)

Note: The following question was only visible to participants that indicated that the primary instructional format during the regular class meeting included at least some active learning.

What active learning techniques are used during the regular class meeting? Mark all that apply.

	All (53)	PhD (33)	MA (20)
POGIL	3 (0.057)	2 (0.061)	1 (0.050)
IBL	9 (0.170)	8 (0.242)	1 (0.050)
Clicker surveys	11 (0.208)	7 (0.212)	4 (0.200)
Group work	43 (0.811)	25 (0.758)	18 (0.900)
Flipped classes	14 (0.264)	10 (0.303)	4 (0.200)
Other	7 (0.132)	3 (0.091)	4 (0.200)

Which of the following best describes the recitation sections accompanying precalculus? Mark all that apply.

	All (246)	PhD (145)	MA (101)
Recitation sections are offered for all lecture sections	54 (0.220)	44 (0.303)	10 (0.099)
Recitation sections are only offered for some lecture sections	12 (0.049)	10 (0.069)	2 (0.020)
Additional recitation sections are available for all students	7 (0.028)	6 (0.041)	1 (0.010)
Additional recitation sections are available specifically for students from traditionally underrepresented groups	3 (0.012)	2 (0.014)	1 (0.010)
Recitation sections are NOT offered for this course	178 (0.724)	90 (0.621)	88 (0.871)

*Note: If a participant indicated that a recitation was **not** offered for a course, the following question was not visible.*

What is the primary instructional format during the recitation section?

	All (64)	PhD (52)	MA (12)
Mainly homework help, Q&A, and review	48 (0.750)	41 (0.788)	7 (0.583)
Mainly techniques that incorporate active learning strategies	9 (0.141)	7 (0.135)	2 (0.167)
Other	7 (0.109)	4 (0.077)	3 (0.250)

Note: The following question was only visible to participants that indicated that the primary instructional format during the recitation section was mainly active learning.

What active learning techniques are used during the recitation section? Mark all that apply.

	All (8)	PhD (7)	MA (1)
POGIL	0 (0.000)	0 (0.000)	0 (0.000)
IBL	1 (0.125)	1 (0.143)	0 (0.000)
Clicker surveys	0 (0.000)	0 (0.000)	0 (0.000)
Group work	6 (0.750)	6 (0.857)	0 (0.000)
Flipped classes	1 (0.125)	1 (0.143)	0 (0.000)
Other	2 (0.250)	1 (0.143)	1 (1.000)

For those terms in which more than one section is offered, what aspects of the course are intended to be uniform across all sections? Mark all that apply

	All (248)	PhD (146)	MA (102)
Textbook	232 (0.935)	139 (0.952)	93 (0.912)
Topics to be covered	237 (0.956)	138 (0.945)	99 (0.971)
Schedule of when topics are covered	138 (0.556)	106 (0.726)	32 (0.314)
Midterms	92 (0.371)	79 (0.541)	13 (0.127)
Final exams	129 (0.520)	100 (0.685)	29 (0.284)
Online homework	123 (0.496)	93 (0.637)	30 (0.294)
Written homework	60 (0.242)	52 (0.356)	8 (0.078)
Quizzes	54 (0.218)	48 (0.329)	6 (0.059)
Couse grading	89 (0.359)	81 (0.555)	8 (0.078)
Exam grading	96 (0.387)	84 (0.575)	12 (0.118)
Instructional approach	77 (0.310)	62 (0.425)	15 (0.147)
Gateway exams	21 (0.085)	16 (0.110)	5 (0.049)
Videos	24 (0.097)	20 (0.137)	4 (0.039)
Handouts	40 (0.161)	36 (0.247)	4 (0.039)
Use of graphing calculators	105 (0.423)	74 (0.507)	31 (0.304)
Other	5 (0.020)	3 (0.021)	2 (0.020)
None	7 (0.028)	5 (0.034)	2 (0.020)

Who coordinates the uniform aspects (as chosen above) across sections?

	All (254)	PhD (149)	MA (105)
Someone for whom this is part of their official responsibilities for multiple years?	138 (0.543)	96 (0.644)	42 (0.400)
Someone for whom this is part of their official responsibilities for a single year?	27 (0.106)	19 (0.128)	8 (0.076)
Someone who happens to be teaching the course this term	20 (0.079)	15 (0.101)	5 (0.048)
Department committee	44 (0.173)	9 (0.060)	35 (0.333)
Other	5 (0.020)	2 (0.013)	3 (0.029)
N/A	20 (0.079)	8 (0.054)	12 (0.114)

When several instructors are teaching in the same term, how often do they typically meet as a group to discuss the course?

	All (238)	PhD (137)	MA (101)
Weekly	38 (0.160)	28 (0.204)	10 (0.099)
Biweekly	14 (0.059)	11 (0.080)	3 (0.030)
2-4 times per term	69 (0.290)	44 (0.321)	25 (0.248)
Once per term	62 (0.261)	36 (0.263)	26 (0.257)
Never	55 (0.231)	18 (0.131)	37 (0.366)

What best characterizes the current status of the course? Mark all that apply.

	All (256)	PhD (149)	MA (107)
No significant changes are planned	154 (0.602)	92 (0.617)	62 (0.579)
Changes have recently/currently being implemented	54 (0.211)	34 (0.228)	20 (0.187)
Possible changes are being discussed	53 (0.207)	27 (0.181)	26 (0.243)

CALCULUS 1 & EQUIVALENTS

Participants were asked to include information about courses which function as first courses single-variable calculus. As detailed in Part III of this report, there were variations among these courses' structure, but here they are all lumped together. In particular, this means that honors courses, courses for students with different backgrounds, and courses for students in specific majors are lumped together, and referred to here as calculus 1 or C1.

197 departments reported detailed information for 327 calculus 1 courses, with 121 PhD-granting departments reporting on 218 courses and 76 MA-granting departments reporting on 109 courses.

Total enrollment in calculus 1 courses by term. Note that "Term 3" is applicable mainly to schools on the quarter system, hence the drop-off in enrollment is not quite as severe as it seems.

	All (318)	PhD (213)	MA (105)
Academic year	190,283	148,408	41,875
Term 1	121,404	96,637	24,767
Term 2	64,561	47,959	16,602
Term 3	4318	3812	506
All Summer	11,686	8,438	3,203

Total contact hours (lecture plus lab/recitation) averaged across all preparation for calculus courses:

	All (325)	PhD (218)	MA (107)
Mean	4.19 hours	4.17 hours	4.25 hours
Standard deviation	0.73 hours	0.77 hours	0.64 hours

What is the typical DFW (drop/fail/withdraw) rate for this course?

	All (288)	PhD (191)	MA (97)
Mean	22.07 %	20.66 %	24.85 %
Standard deviation	12.88	12.24	13.70

How often is calculus 1 taught by a **tenured or tenured track** faculty?

	All (321)	PhD (213)	MA (108)
Never	28 (0.087)	26 (0.122)	2 (0.019)
Rarely	66 (0.206)	56 (0.263)	10 (0.093)
Frequently	227 (0.707)	131 (0.615)	96 (0.889)

How often is calculus 1 taught by a **full-time teaching** faculty?

	All (307)	PhD (205)	MA (102)
Never	53 (0.173)	33 (0.161)	20 (0.196)
Rarely	52 (0.169)	39 (0.190)	13 (0.127)
Frequently	202 (0.658)	133 (0.649)	69 (0.676)

How often is calculus 1 taught by a part-time teaching faculty, visiting faculty, or postdoctoral researchers?

	All (306)	PhD (202)	MA (104)
Never	80 (0.261)	39 (0.193)	41 (0.394)
Rarely	99 (0.324)	65 (0.322)	34 (0.327)
Frequently	127 (0.415)	98 (0.485)	29 (0.279)

How often is calculus 1 taught by **graduate teaching assistants (GTAs)**?

	All (297)	PhD (199)	MA (98)
Never	161 (0.542)	74 (0.372)	87 (0.888)
Rarely	61 (0.205)	53 (0.266)	8 (0.082)
Frequently	75 (0.253)	72 (0.362)	3 (0.031)

How often is calculus 1 taught by **other titles not listed above**?

	All (32)	PhD (15)	MA (17)
Never	27 (0.844)	10 (0.667)	17 (1.000)
Rarely	0 (0.000)	0 (0.000)	0 (0.000)
Frequently	5 (0.156)	5 (0.333)	0 (0.000)

What is the primary instructional format during the regular class meeting (not recitation sections)?

	All (323)	PhD (214)	MA (109)
Lecture and answering student questions	211 (0.653)	154 (0.720)	57 (0.523)
Lecture incorporating some active learning techniques	55 (0.170)	29 (0.136)	26 (0.239)
Minimal lecture with mainly active learning techniques	9 (0.028)	7 (0.033)	2 (0.018)
Lecture plus computer based instruction	7 (0.022)	1 (0.005)	6 (0.055)
There is too much variation	38 (0.118)	22 (0.103)	16 (0.147)
Other	3 (0.009)	1 (0.005)	2 (0.018)

Note: The following question was only visible to participants that indicated that the primary instructional format during the regular class meeting included at least some active learning.

What active learning techniques are used during the regular class meeting? Mark all that apply.

	All (59)	PhD (33)	MA (26)
POGIL	3 (0.051)	3 (0.091)	0 (0.000)
IBL	10 (0.169)	7 (0.212)	3 (0.115)
Clicker surveys	13 (0.220)	9 (0.273)	4 (0.154)
Group work	50 (0.847)	25 (0.758)	25 (0.962)
Flipped classes	14 (0.237)	9 (0.273)	5 (0.192)
Other	9 (0.153)	3 (0.091)	6 (0.231)

Which of the following best describes the recitation sections accompanying calculus 1? Mark all that apply.

	All (316)	PhD (212)	MA (104)
Recitation sections are offered for all lecture sections	123 (0.389)	104 (0.491)	19 (0.183)
Recitation sections are only offered for some lecture sections	17 (0.054)	13 (0.061)	4 (0.038)
Additional recitation sections are available for all students	6 (0.019)	5 (0.024)	1 (0.010)
Additional recitation sections are available specifically for students from traditionally underrepresented groups	2 (0.006)	1 (0.005)	1 (0.010)
Recitation sections are NOT offered for this course	174 (0.551)	95 (0.448)	79 (0.760)

*Note: If a participant indicated that a recitation was **not** offered for a course, the following question was not visible.*

What is the primary instructional format during the recitation section?

	All (138)	PhD (115)	MA (23)
Mainly homework help, Q&A, and review	101 (0.732)	84 (0.730)	17 (0.739)
Mainly techniques that incorporate active learning strategies	25 (0.181)	24 (0.209)	1 (0.043)
Other	12 (0.087)	7 (0.061)	5 (0.217)

Note: The following question was only visible to participants that indicated that the primary instructional format during the recitation section was mainly active learning.

What active learning techniques are used during the recitation section? Mark all that apply.

	All (25)	PhD (24)	MA (1)
POGIL	1 (0.040)	1 (0.042)	0 (0.000)
IBL	3 (0.120)	3 (0.125)	0 (0.000)
Clicker surveys	1 (0.040)	1 (0.042)	0 (0.000)
Group work	24 (0.960)	23 (0.958)	1 (1.000)
Flipped classes	4 (0.160)	4 (0.167)	0 (0.000)
Other	6 (0.240)	5 (0.208)	1 (1.000)

For those terms in which more than one section is offered, what aspects of the course are intended to be uniform across all sections? Mark all that apply.

	All (310)	PhD (207)	MA (103)
Textbook	281 (0.906)	188 (0.908)	93 (0.903)
Topics to be covered	281 (0.906)	185 (0.894)	96 (0.932)
Schedule of when topics are covered	146 (0.471)	125 (0.604)	21 (0.204)
Midterms	98 (0.316)	90 (0.435)	8 (0.078)
Final exams	147 (0.474)	124 (0.599)	23 (0.223)
Online homework	110 (0.355)	93 (0.449)	17 (0.165)
Written homework	62 (0.200)	58 (0.280)	4 (0.039)
Quizzes	38 (0.123)	37 (0.179)	1 (0.010)
Couse grading	110 (0.355)	102 (0.493)	8 (0.078)
Exam grading	111 (0.358)	103 (0.498)	8 (0.078)
Instructional approach	53 (0.171)	48 (0.232)	5 (0.049)
Gateway exams	40 (0.129)	35 (0.169)	5 (0.049)
Videos	22 (0.071)	18 (0.087)	4 (0.039)
Handouts	31 (0.100)	29 (0.140)	2 (0.019)
Use of graphing calculators	109 (0.352)	83 (0.401)	26 (0.252)
Other	14 (0.045)	5 (0.024)	9 (0.087)
None	26 (0.084)	19 (0.092)	7 (0.068)

Who coordinates the uniform aspects (as chosen above) across sections?

	All (316)	PhD (210)	MA (106)
Someone for whom this is part of their official responsibilities for multiple years?	125 (0.396)	95 (0.452)	30 (0.283)
Someone for whom this is part of their official responsibilities for a single year?	36 (0.114)	28 (0.133)	8 (0.075)
Someone who happens to be teaching the course this term	47 (0.149)	36 (0.171)	11 (0.104)
Department committee	66 (0.209)	24 (0.114)	42 (0.396)
Other	2 (0.006)	2 (0.010)	0 (0.000)
N/A	40 (0.127)	25 (0.119)	15 (0.142)

When several instructors are teaching in the same term, how often do they typically meet as a group to discuss the course?

	All (298)	PhD (197)	MA (101)
Weekly	50 (0.168)	44 (0.223)	6 (0.059)
Biweekly	17 (0.057)	15 (0.076)	2 (0.020)
2-4 times per term	67 (0.225)	41 (0.208)	26 (0.257)
Once per term	65 (0.218)	41 (0.208)	24 (0.238)
Never	99 (0.332)	56 (0.284)	43 (0.426)

What best characterizes the current status of the course? Mark all that apply.

	All (322)	PhD (215)	MA (107)
No significant changes are planned	224 (0.696)	141 (0.656)	83 (0.776)
Changes have recently/currently being implemented	57 (0.177)	48 (0.223)	9 (0.084)
Possible changes are being discussed	48 (0.149)	31 (0.144)	17 (0.159)

CALCULUS 2 & EQUIVALENTS

Participants were asked to include information about further (i.e., not first) courses in single-variable calculus. As detailed in Part III of this report, there were variations among these courses' structure, but here they are all lumped together. In particular, this means that single-course pre-calculus responses are lumped together with college algebra/trigonometry paired courses, which are here referred to as calculus 2 or C2 courses.

195 departments reported detailed information for 301 calculus 2 courses, with 119 PhD-granting departments reporting on 205 courses and 76 MA-granting departments reporting on 96 courses.

Total enrollment in calculus 2 courses by term is in the table below. Note that "Term 3" is applicable mainly to schools on the quarter system, and having a "Term 4" is even rarer, hence the drop-off in enrollment is not quite as severe as it seems.

	All (273)	PhD (187)	MA (86)
Academic year	151,458	121,700	29,758
Term 1	65,507	51,969	13,538
Term 2	77,143	61,706	15,437
Term 3	8,693	7,910	783
Term 4	115	115	0
All Summer	121,134	9,564	2,570

Total contact hours (lecture plus lab/recitation) averaged across all preparation for calculus courses:

	All (300)	PhD (205)	MA (84)
Mean	4.19 hours	4.17 hours	4.22 hours
Standard deviation	0.73 hours	0.78 hours	0.61 hours

What is the typical DFW (drop/fail/withdraw) rate for this course?

	All (264)	PhD (180)	MA (84)
Mean	20.05 %	18.20 %	23.95 %
Standard deviation	12.67	11.64	13.90

How often is calculus 2 taught by a **tenured or tenured track** faculty?

	All (296)	PhD (201)	MA (95)
Never	22 (0.074)	22 (0.109)	0 (0.000)
Rarely	41 (0.139)	38 (0.189)	3 (0.032)
Frequently	233 (0.787)	141 (0.701)	92 (0.968)

How often is calculus 2 taught by a **full-time teaching** faculty?

	All (286)	PhD (195)	MA (91)
Never	56 (0.196)	37 (0.190)	19 (0.209)
Rarely	49 (0.171)	35 (0.179)	14 (0.154)
Frequently	181 (0.633)	123 (0.631)	58 (0.637)

How often is calculus 2 taught by a **part-time teaching faculty, visiting faculty, or postdoctoral researcher**?

	All (288)	PhD (195)	MA (93)
Never	79 (0.274)	38 (0.195)	41 (0.441)
Rarely	95 (0.330)	66 (0.338)	29 (0.312)
Frequently	114 (0.396)	91 (0.467)	23 (0.247)

How often is calculus 2 taught by **graduate teaching assistants (GTAs)**?

	All (271)	PhD (184)	MA (87)
Never	167 (0.616)	86 (0.467)	81 (0.931)
Rarely	41 (0.151)	38 (0.207)	3 (0.034)
Frequently	63 (0.232)	60 (0.326)	3 (0.034)

How often is calculus 2 taught by **other titles not listed above**?

	All (36)	PhD (18)	MA (18)
Never	31 (0.861)	13 (0.722)	18 (1.000)
Rarely	1 (0.028)	1 (0.056)	0 (0.000)
Frequently	4 (0.111)	4 (0.222)	0 (0.000)

What is the primary instructional format during the regular class meeting (not recitation sections)?

	All (298)	PhD (202)	MA (96)
Lecture and answering student questions	219 (0.735)	157 (0.777)	62 (0.646)
Lecture incorporating some active learning techniques	38 (0.128)	21 (0.104)	17 (0.177)
Minimal lecture with mainly active learning techniques	3 (0.010)	3 (0.015)	0 (0.000)
Lecture plus computer based instruction	9 (0.030)	3 (0.015)	6 (0.063)
There is too much variation	24 (0.081)	14 (0.069)	10 (0.104)
Other	5 (0.017)	4 (0.020)	1 (0.010)

Note: The following question was only visible to participants that indicated that the primary instructional format during the regular class meeting included at least some active learning.

What active learning techniques are used during the regular class meeting? Mark all that apply.

	All (41)	PhD (24)	MA (17)
POGIL	1 (0.024)	1 (0.042)	0 (0.000)
IBL	7 (0.171)	4 (0.167)	3 (0.176)
Clicker surveys	10 (0.244)	8 (0.333)	2 (0.118)
Group work	33 (0.805)	17 (0.708)	16 (0.941)
Flipped classes	6 (0.146)	5 (0.208)	1 (0.059)
Other	9 (0.220)	4 (0.167)	5 (0.294)

Which of the following best describes the recitation sections accompanying calculus 2? Mark all that apply.

	All (292)	PhD (200)	MA (92)
Recitation sections are offered for all lecture sections	106 (0.363)	91 (0.455)	15 (0.163)
Recitation sections are only offered for some lecture sections	14 (0.048)	11 (0.055)	3 (0.033)
Additional recitation sections are available for all students	4 (0.014)	3 (0.015)	1 (0.011)
Additional recitation sections are available specifically for students from traditionally underrepresented groups	2 (0.007)	0 (0.000)	2 (0.022)
Recitation sections are NOT offered for this course	167 (0.572)	96 (0.480)	71 (0.772)

*Note: If a participant indicated that a recitation was **not** offered for a course, the following question was not visible.*

What is the primary instructional format during the recitation section?

	All (119)	PhD (101)	MA (18)
Mainly homework help, Q&A, and review	87 (0.731)	74 (0.733)	13 (0.722)
Mainly techniques that incorporate active learning strategies	18 (0.151)	16 (0.158)	2 (0.111)
Other	14 (0.118)	11 (0.109)	3 (0.167)

Note: The following question was only visible to participants that indicated that the primary instructional format during the recitation section was mainly active learning.

What active learning techniques are used during the recitation section? Mark all that apply.

	All (18)	PhD (16)	MA (2)
POGIL	0 (0.000)	0 (0.000)	0 (0.000)
IBL	1 (0.056)	1 (0.063)	0 (0.000)
Clicker surveys	0 (0.000)	0 (0.000)	0 (0.000)
Group work	17 (0.944)	15 (0.938)	2 (1.000)
Flipped classes	4 (0.222)	4 (0.250)	0 (0.000)
Other	5 (0.278)	4 (0.250)	1 (0.500)

For those terms in which more than one section is offered, what aspects of the course are intended to be uniform across all sections? Mark all that apply.

	All (285)	PhD (191)	MA (94)
Textbook	265 (0.930)	175 (0.916)	90 (0.957)
Topics to be covered	258 (0.905)	171 (0.895)	87 (0.926)
Schedule of when topics are covered	126 (0.442)	109 (0.571)	17 (0.181)
Midterms	70 (0.246)	68 (0.356)	2 (0.021)
Final exams	109 (0.382)	96 (0.503)	13 (0.138)
Online homework	78 (0.274)	68 (0.356)	10 (0.106)
Written homework	46 (0.161)	44 (0.230)	2 (0.021)
Quizzes	30 (0.105)	30 (0.157)	0 (0.000)
Couse grading	81 (0.284)	78 (0.408)	3 (0.032)
Exam grading	75 (0.263)	72 (0.377)	3 (0.032)
Instructional approach	38 (0.133)	34 (0.178)	4 (0.043)
Gateway exams	29 (0.102)	27 (0.141)	2 (0.021)
Videos	16 (0.056)	16 (0.084)	0 (0.000)
Handouts	26 (0.091)	26 (0.136)	0 (0.000)
Use of graphing calculators	86 (0.302)	69 (0.361)	17 (0.181)
Other	13 (0.046)	5 (0.026)	8 (0.085)
None	18 (0.063)	15 (0.079)	3 (0.032)

Who coordinates the uniform aspects (as chosen above) across sections?

	All (291)	PhD (197)	MA (94)
Someone for whom this is part of their official responsibilities for multiple years?	106 (0.364)	81 (0.411)	25 (0.266)
Someone for whom this is part of their official responsibilities for a single year?	30 (0.103)	25 (0.127)	5 (0.053)
Someone who happens to be teaching the course this term	47 (0.162)	36 (0.183)	11 (0.117)
Department committee	69 (0.237)	27 (0.137)	42 (0.447)
Other	4 (0.014)	4 (0.020)	0 (0.000)
N/A	35 (0.120)	24 (0.122)	11 (0.117)

When several instructors are teaching in the same term, how often do they typically meet as a group to discuss the course?

	All (278)	PhD (185)	MA (93)
Weekly	43 (0.155)	37 (0.200)	6 (0.065)
Biweekly	16 (0.058)	14 (0.076)	2 (0.022)
2-4 times per term	52 (0.187)	35 (0.189)	17 (0.183)
Once per term	65 (0.234)	35 (0.189)	30 (0.323)
Never	102 (0.367)	64 (0.346)	38 (0.409)

What best characterizes the current status of the course? Mark all that apply.

	All (296)	PhD (200)	MA (96)
No significant changes are planned	230 (0.777)	148 (0.740)	82 (0.854)
Changes have recently/currently being implemented	34 (0.115)	32 (0.160)	2 (0.021)
Possible changes are being discussed	35 (0.118)	22 (0.110)	13 (0.135)

PART III: VARIATIONS IN COURSE STRUCTURE

In addition to the traditional three-term Precalculus, Calculus 1, Calculus 2 sequence format, a number of what we call "variations in course structure" were identified. These are P2C2 courses which do not follow the traditional three-semester Precalculus, Calculus 1, Calculus 2 structure, but do qualify students for further study in mathematics. In this section we provide a description of these alternate course structures and an overview of their prevalence within the P2C2 sequence. A more detailed analysis of this information, as well as its implications, is currently underway for publication.

DESCRIPTION OF COURSE STRUCTURE VARIATIONS

Modular precalculus	Two or more courses which, when taken together, are intended to prepare students for single variable calculus (e.g., College Algebra + Trigonometry). These courses usually also give students more course credits than a single-course precalculus equivalent.
Co-calculus	A course taken concurrently with a single variable calculus course that covers selected precalculus topics, coordinated with the content of the calculus course.
Stretched out Calculus	Two courses which, when taken together, are the equivalent of a single calculus course. These courses usually give students more course credits than their single-course equivalent.
Stretched out Calculus 1 & 2	Three courses which, when taken together, are equivalent to a standard two-course single variable calculus sequence. The first course in these sequences was considered with other "first calculus" (C1) courses; the second and third are considered "further calculus" (C2).
Calculus infused with precalculus	A calculus course which explicitly includes attention to requisite pre-calculus topics. These courses usually give students more credits than an equivalent course without precalculus.
Calculus for biology	A mainstream calculus course designed explicitly for students in biological or life science majors.
Calculus for engineering	A mainstream calculus course designed explicitly for students in engineering majors.
Calculus for another subject	A mainstream calculus course designed explicitly for students in a non-STEM major.
Accelerated Calculus	A calculus course explicitly designed for students who have taken calculus in high school (usually with AP credit). These courses cover mainly material that would be considered "Calculus 2," but also include Calculus I material that may not have been covered in sufficient depth in an AP course.
Transition to mainstream	A course which serves to transition students from a non-mainstream precalculus/calculus sequence into mainstream calculus or upper-division mathematics courses.
Other	Further variations that were not common enough to warrant their own code. These include courses designed to divert less-prepared students mid-term; precalculus courses which include a preview of calculus topics; courses designed for transfer students; applied courses; summer courses; and more.

OVERVIEW OF COURSE STRUCTURES DATA

The table below indicates the number of departments that offer courses of the identified variations. Of course, many departments offer more than one variation and so the columns do not sum to the number of respondents. We note that the data for this analysis was sourced from departmental websites in addition to survey data, as the data obtained in the survey was insufficient for this purpose.

Variation	All (223)	PhD (134)	MA (89)
Modular precalculus*	67	37	30
Co-calculus	10	7	3
Stretched out calculus	23	16	7
Stretched out calculus 1 & 2	7	6	1
Calculus infused with precalculus	11	7	4
Calculus for biology	18	12	6
Calculus for engineering	11	11	0
Calculus for another subject	7	5	2
Accelerated calculus	15	13	2
Transition to mainstream	3	2	1
Other	14	13	1
No variation**	61	29	32
No variation except honors	82	43	39

*Refers only to programs where a two-course preparation for calculus is offered as an alternative to a single precalculus course, not those where students have no option. In addition to the 67 institutions identified in the table above, 23 institutions offer modular precalculus as the only preparation for single variable calculus.
**Refers to programs where no course variations are offered for PC, C1, or C2 (including honors).

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If you have any questions about this report or the Progress through Calculus project, please contact Naneh Apkarian at naneh.apkarian@gmail.com or David Bressoud at bressoud@macalester.edu.