

OPEN APEREO

100% OPEN · 100% ONLINE

2020

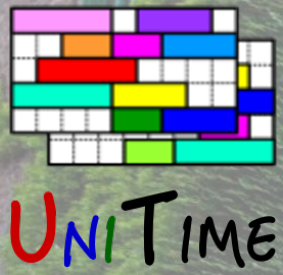
June 15-19

UniTime

Comprehensive University Scheduling System

Tomáš Müller





Educational Timetabling

What is educational timetabling?

- A process of assigning classes (or exams) in time and space
- A hard optimization problem with many (often contradictory) objectives
 - Student conflicts, faculty requirements, space constraints

Why is it needed?

- To minimize student conflicts; students get their degree in time
- Helps to use your resources more effectively
- Makes the process easier to manage (knowledge transfer and cooperation)
- Fairness and satisfaction with the timetable
- What-if scenarios
- Ability to adapt to a change
- ...



Introducing UniTime

What is UniTime?

- Comprehensive academic scheduling solution

The collage displays several key features of the UniTime application:

- Rooms:** A list of classrooms with filters for department, capacity, and availability. A map view shows the location of rooms on a campus.
- Class Detail:** A page showing details for a specific class, including the manager, enrollment, room, and instructor.
- Instructional Offering Detail:** A page showing details for a specific instructional offering, including the title, consent, and enrollment.
- Log In:** A login page with fields for username and password.
- Personal Timetable:** A page showing a user's personal timetable with a search and export button.
- Examinations:** A page showing a list of examinations with filters for type, subject, and course number.
- Configuration 1:** A table showing the configuration of various classes and rooms.
- Examinations Table:** A table showing the details of various examinations, including the class, course, length, seating size, max instructor period, room, distribution, assigned period, and assigned room.

Version 3.5.89 built on Wed, 7 May 2014
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Introducing UniTime

What is UniTime?

- Comprehensive academic scheduling solution
- Five components

Courses: time & rooms

- time preferences
- room requirements
- availability
- course structure
- avoid time clashes

Events: room bookings

- course-related events
- personal schedule
- approval process
- unavailabilities

Exams: period & rooms

- minimize student conflicts
- period & room prefs
- distributions
- room sharing

Instructors: teaching assignments

- teaching load
- qualifications / skills
- preferences
- course spreading

Students: class schedule

- course requirements
- alternatives / free times
- reservations
- section balancing
- schedule quality



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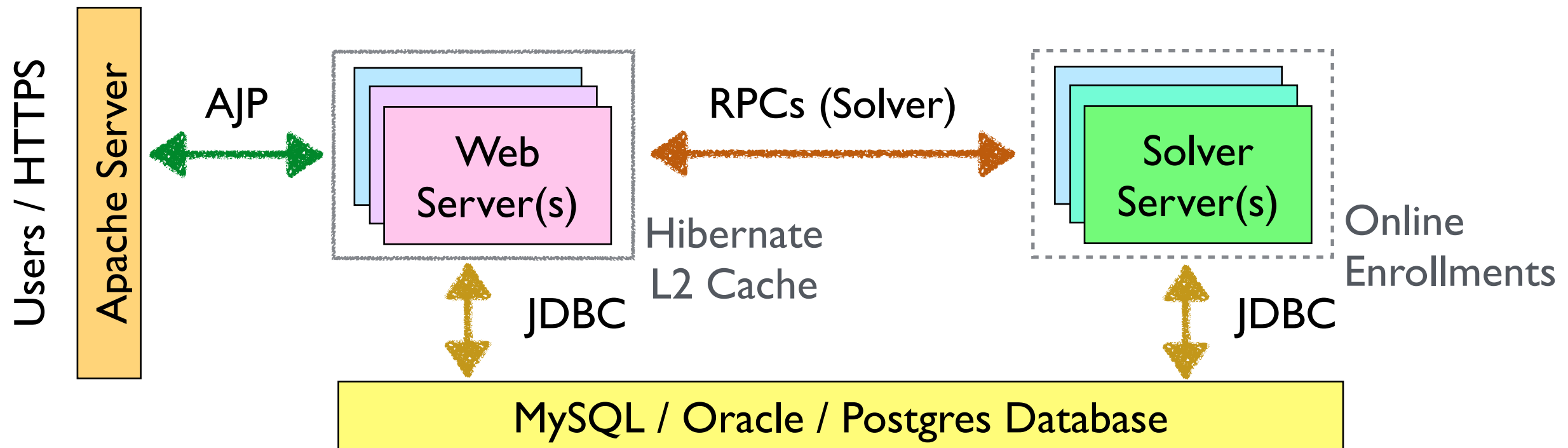
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Introducing UniTime

What is UniTime?

- Comprehensive academic scheduling solution
- Five components: course timetabling, examination timetabling, student scheduling, instructor scheduling, and event management
- Open Source, web-based, written in Java using modern technologies





Introducing UniTime

What is UniTime?

- Comprehensive academic scheduling solution
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- Open Source, web-based, written in Java using modern technologies
- Using state of the art optimization algorithms

PURDUE
UNIVERSITY



International
Timetabling
Competition 2019



ITC 2019

- course timetabling with students
- 3 sets of problems (10 each)
- 200+ registrations
- 12 solvers
- 2 milestones
- 5 finalists

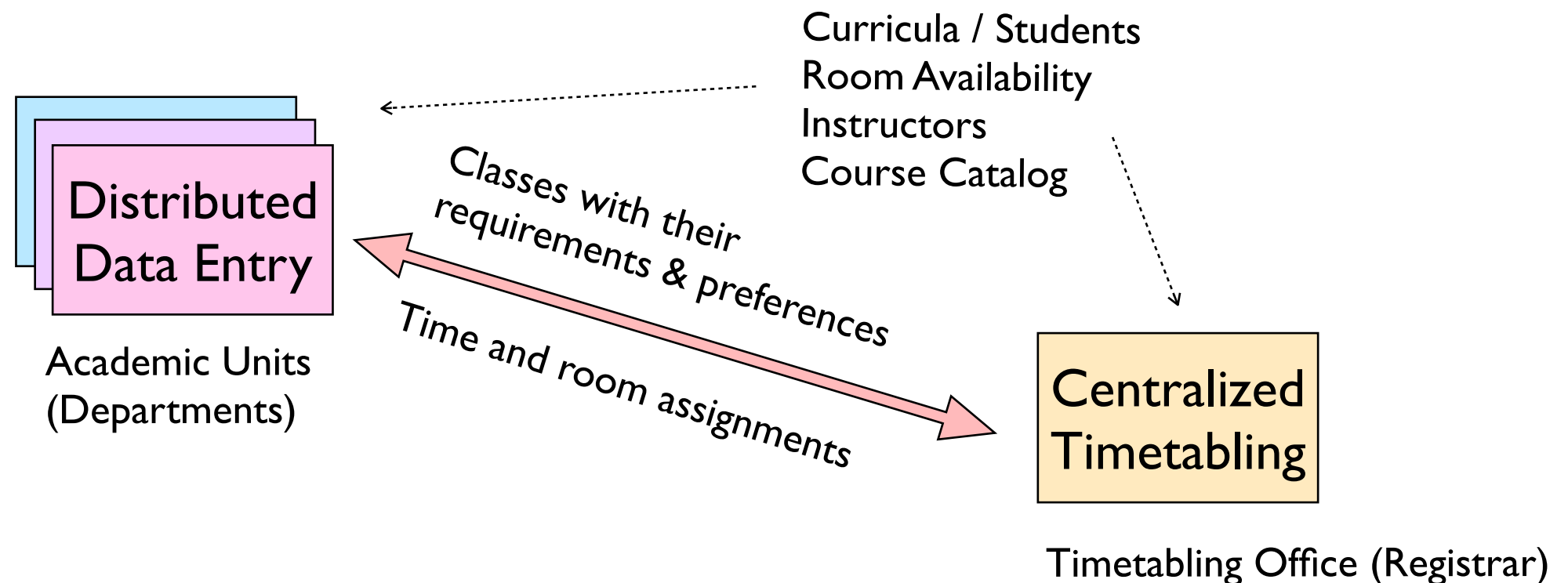
<https://www.itc2019.org>



Introducing UniTime

What is UniTime?

- Comprehensive academic scheduling solution
- Five components: course timetabling, examination timetabling, student scheduling, instructor scheduling, and event management
- Open Source, web-based, written in Java using modern technologies
- Using state of the art optimization algorithms
- Distributed data entry and timetabling in a multi-user environment





UniTime Users

World cloud

- All voluntary registrations
- 75 institutions have indicated that they use UniTime in production
- 50 new registrations during the last 12 months (10 production)
- 10 institutions from 4 continents has provided data for the ITC 2019 competition





UniTime Releases

UniTime Versions

- One major release each year (UniTime 4.4 is our current production)
 - Minor releases on bi-monthly bases or as needed
- Next release: UniTime 4.5, later this year
 - Pre-registration & batch scheduling, advisor support
 - Improvements in re-scheduling (due to COVID)
 - Dozens of small improvements across all the components
- Future Development
 - Student scheduling - automated waitlisting



New: Advisor Support

Student Scheduling (now with advisor support)

I. Student meets with the advisor

UNiTIME Advisor Course Recommendations ?
Muller, Tomas Administrator Session: Fall 2020 (PWL) [Click here to change the session.](#)

☐ Send email confirmation

Student's Name: Student, Joe Id: 27048142
Advisor/Email: muller@purdue.edu Term: Fall 2020 (PWL)
Status: TEST: All Enabled

Student Course Requests

Priority	Course	Title	Credit	Requested
1. Priority	CS 18000BLK	Prob Solving & O-O Programming	4	06/11/2020
2. Priority	CS 19100	Freshm Resources Semnr	1	06/11/2020
3. Priority	CS 19300	Tools	1	06/11/2020

Advisor Course Recommendations Credit Hours Notes

1. Priority PHIL 26000 3 - 4 Enter these as alternatives on your course request form to ensure you get a written communication course.

1. Alternative SCLA 10100
2. Alternative ENGL 10800
3. Alternative ENGL 10600

2. Priority MA 16100 11458-960 3 - 5
1. Alternative MA 16010 18135-038

3. Priority ITAL 10100 3 Select one of these to begin work on your foreign language requirement.

1. Alternative GER 10100
2. Alternative SPAN 10100

4. Priority Enter a course name, e.g., ENG 10600
5. Priority or a free time, e.g., Free MWF 7:30 - 8:30
6. Priority
7. Priority
8. Priority
9. Priority Course with the lowest priority.

Total Priority Credit Hours: 9 - 12

Substitute Advisor Course Recommendations (used only if a course requested above is not available)

1. Substitute HIST 10300 3
2. Substitute

Additional Notes: Your student registration PIN is 999999. You will need this if you decide to make changes to your course schedule once you have been registered.

☐ Send email confirmation

- Fill in Advisor Recommendations (using degree plan, etc.)
- Alternative and substitute courses, section pre-assignments
- Placeholders & additional notes (e.g., foreign language 3 credits)
- PDF confirmation

PURDUE UNIVERSITY Advisor Course Recommendations

Student's Name: Student, Joe Id: 27048142
Advisor/Email: muller@purdue.edu Term: Fall 2020 (PWL)
Status: TEST: All Enabled

Advisor Course Recommendations Credit Notes

1. Priority PHIL 26000 Philosophy And Law 3 - 4 Enter these as alternatives on your course request form to ensure you get a written communication course.

1. Alternative SCLA 10100 Coll Think & Com I
2. Alternative ENGL 10800 Acad First-Yr Compos
3. Alternative ENGL 10600 First-Year Composition

2. Priority MA 16100 11458-960 - Pt Any Geo Calc I 3 - 5
1. Alternative MA 16010 18135-038 - Applied Calculus I

3. Priority ITAL 10100 Italian Level I 3 Select one of these to begin work on your foreign language requirement.

1. Alternative GER 10100 German Level I
2. Alternative SPAN 10100 Spanish Level I

Total Priority Credit Hours: 9 - 12

Substitute Advisor Course Recommendations (used only if a course requested above is not available)

1. Priority HIST 10300 Intro To Medieval World 3

Your student registration PIN is 999999. You will need this if you decide to make changes to your course schedule once you have been registered.

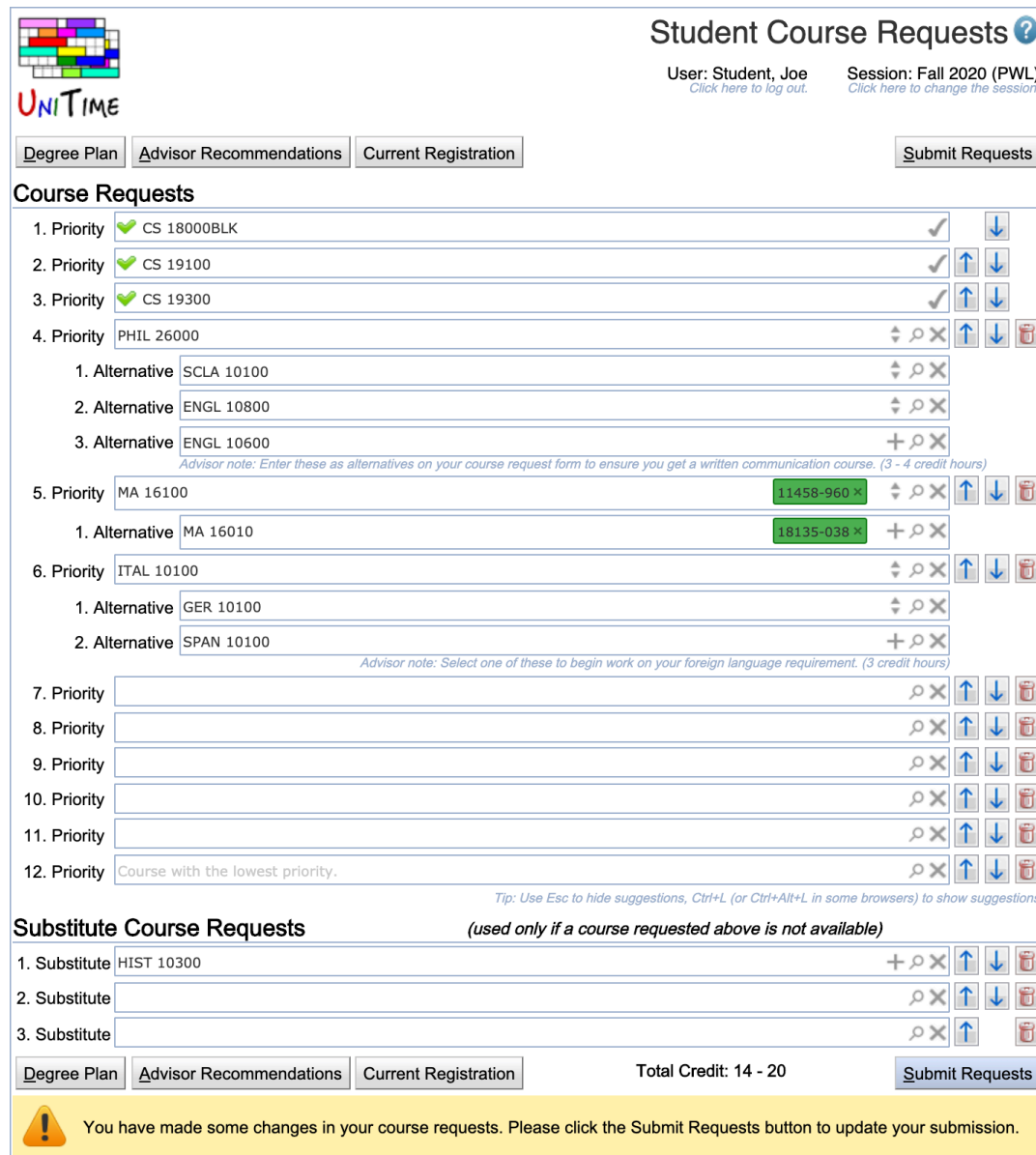
Advisor's Signature: _____ Date: _____
Student's Signature: _____ Date: _____

Students are responsible for meeting course prerequisites and fulfilling degree requirements, and are ultimately responsible for their own educational plan and academic success.

06/11/2020 06:29PM UnTime 4.5.7 © 2008 - 2020 The Apereo Foundation, distributed under the Apache License. 1

Student Scheduling (now with advisor support)

1. Student meets with the advisor
2. Student fills in pre-registration



Student Course Requests ?

User: Student, Joe [Click here to log out.](#) Session: Fall 2020 (PWL) [Click here to change the session.](#)

UNiTIME

[Degree Plan](#) [Advisor Recommendations](#) [Current Registration](#) [Submit Requests](#)

Course Requests

1. Priority	✓ CS 18000BLK	✓	↓
2. Priority	✓ CS 19100	✓	↑ ↓
3. Priority	✓ CS 19300	✓	↑ ↓
4. Priority	PHIL 26000	⬇ ⬆ ⬇	↑ ↓
1. Alternative	SCLA 10100	⬇ ⬆ ⬇	
2. Alternative	ENGL 10800	⬇ ⬆ ⬇	
3. Alternative	ENGL 10600	+ ⬆ ⬇	
<small>Advisor note: Enter these as alternatives on your course request form to ensure you get a written communication course. (3 - 4 credit hours)</small>			
5. Priority	MA 16100	11458-960 ✕	↑ ↓
1. Alternative	MA 16010	18135-038 ✕	+ ⬆ ⬇
6. Priority	ITAL 10100	⬇ ⬆ ⬇	↑ ↓
1. Alternative	GER 10100	⬇ ⬆ ⬇	
2. Alternative	SPAN 10100	+ ⬆ ⬇	
<small>Advisor note: Select one of these to begin work on your foreign language requirement. (3 credit hours)</small>			
7. Priority		⬆ ✕	↑ ↓
8. Priority		⬆ ✕	↑ ↓
9. Priority		⬆ ✕	↑ ↓
10. Priority		⬆ ✕	↑ ↓
11. Priority		⬆ ✕	↑ ↓
12. Priority	Course with the lowest priority.	⬆ ✕	↑ ↓

Tip: Use Esc to hide suggestions, Ctrl+L (or Ctrl+Alt+L in some browsers) to show suggestions.

Substitute Course Requests (used only if a course requested above is not available)

1. Substitute	HIST 10300	+ ⬆ ✕	↑ ↓
2. Substitute		⬆ ✕	↑ ↓
3. Substitute		⬆ ✕	↑

[Degree Plan](#) [Advisor Recommendations](#) [Current Registration](#) **Total Credit: 14 - 20** [Submit Requests](#)

! You have made some changes in your course requests. Please click the Submit Requests button to update your submission.

- Pre-populated with advisor recommendations, but can make additional changes
- Request approvals (e.g., pre-requisite overrides, departmental permissions)
- May include free time requests and preferences



New: Advisor Support

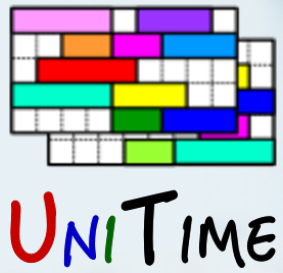
Student Scheduling (*now with advisor support*)

1. Student meets with the advisor
2. Student fills in pre-registration
3. Schedule is built for all pre-reg students
 - Nightly test runs to detect conflicts & demand issues early
 - Critical courses have higher priority

Filter: UC01 x ▼ x Search Export More ▼

Enrollments		Students											
Subject Type	Course CRN-SectionId	Title Time	Consent Date	Room	Available	Projection	Snapshot ↑	Enrollment	Not-Enrolled	Alternative	Reservation	Need Consent	Need Override
+	SCLA 10100				10 / 310	-	930	290	38	98	10	-	-
+	ENGL 10600INTL				0 / 159	-	180	159	7	-	-	-	-
+	PHIL 26000				0 / 150	-	150	150	2	47	-	-	-
+	ENGL 10600				0 / 86	-	700	86	69	77	-	-	-
+	ENGL 10600DIST				0 / 80	-	320	80	2	64	-	-	-
+	COM 20400				16 / 90	-	144	74	-	-	1	-	-
+	ENGL 10800				0 / 70	-	380	70	10	93	-	-	-
+	ENGL 10600LCOM				51 ^r / 120	-	120	69	1	-	69	-	-
+	EDCI 20500				91 + 10 ^r / 152	-	154	51	-	-	12	-	-
+	AMST 10100				0 / 46	-	46	46	2	41	-	-	-
+	HONR 19903				0 / 20	-	20	20	7	2	2	-	-
Total					1268 / 1351			1095	138	422	94	-	-

r) Space available only with a reservation.
w) Wait-listed requests.



New: Advisor Support

Student Scheduling (*now with advisor support*)

1. Student meets with the advisor
2. Student fills in pre-registration
3. Schedule is built for all pre-reg students
4. Students review their schedule, make changes, additional approvals
 - Students that do not pre-register, skip steps 2 and 3
 - Can still make use of advisor recommendations (pre-populated courses)

Student Scheduling Assistant ?

User: Student, Joe Session: Fall 2020 (PWL)
[Click here to log out.](#) [Click here to change the session.](#)

[Add/Drop Courses](#) [Rearrange Schedule](#) [Current Registration](#) [Submit Schedule](#) [Export PDF](#)

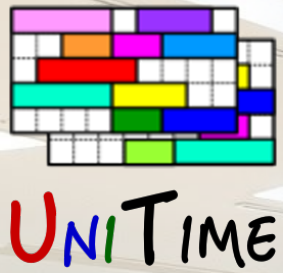
[List of Classes](#) [Time Grid](#) **Class Schedule**

Lock	Subject	Course	Type	Class	Avail	Days	Start	End	Date	Room	Instructor	Requires	Note	Credit
	CS	18000BLK	Lec	10687-BLK	287 / 288	MWF	11:30a	12:20p	08/24 - 12/11	CL50 224		Waiting for consent of department	Supplemental Instruction (SI) st... Students registering for this cou...	4
			Lab	22689-LC1	23 / 24	W	3:30p	5:20p	08/26 - 12/09	HAAS G056		10687-BLK	Supplemental Instruction (SI) st...	✓
	CS	19100	Lec (Hybrid)	24515-LC1	71 / 72	F	2:30p	3:20p	08/28 - 10/16	HIKS G980D	L J Obrien, P M Leblanc	Waiting for consent of department	Students registering for this cou...	1
			Dist (Hybrid)	24527-D01	719 / 720	Arrange Hours			08/24 - 10/20		L J Obrien, K B Jones	Waiting for consent of department	Students registering for this cou...	✓
	CS	19300	Lec	24530-LE2	191 / 192	T	8:30a	9:20a	08/25 - 12/08	SMTH 108	S M Thomas, A J Smith	Waiting for consent of department		1
			Pso	24536-PO3	95 / 96	M	2:30p	3:20p	08/24 - 12/07	MSEE B012		24530-LE2		✓
	PHIL	26000	Lec	20280-007	149 / 150	TR	3:30p	4:20p	08/25 - 12/10	LILY 1105	L Parrish			3
			Rec	20273-002	24 / 25	F	9:30a	10:20a	08/28 - 12/11	BRNG 1230				✓
	MA	16100	Lec	11458-960	119 / 120	T	10:30a	11:45a	08/25 - 12/08	WALC 2087	J R Peterson		Supplemental Instruction (SI) st... Evening Exams Required. Prere... Supplemental Instruction (SI) st...	5
			Rec	11474-965	39 / 40	WF	1:30p	2:20p	08/26 - 12/11	REC 113		11458-960	Supplemental Instruction (SI) st... Evening Exams Required. Prere...	✓
			Ind	11478-IMA	119 / 120	Arrange Hours			08/24 - 12/12		J R Peterson	11458-960	Supplemental Instruction (SI) st... Evening Exams Required. Prere...	✓
	ITAL	10100	Lec	17028-002	19 / 20	MWF	12:30p	1:20p	08/24 - 12/11	SC G014	G Grande			3
Total Credit: 17														✓

[New Course](#) [Add/Drop Courses](#) [Rearrange Schedule](#) [Current Registration](#) [Submit Schedule](#) [Export PDF](#) ☒ Show unassignments



- Implemented at Purdue starting Fall 2020 registration
- Advisor course recommendations filled in for over 9,600 students



Re-Scheduling at Purdue

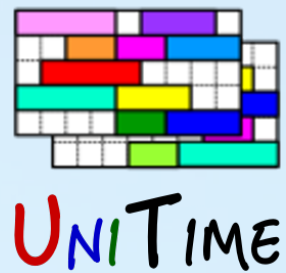
Schedule changes for Fall 2020 at Purdue

- Purdue will resume in-person classes in Fall
- Some courses/classes will be moved online
- Room capacity reduced to ~50% to improve social distancing
- Options: keep as is, find larger room, add sections, alternate attendance

UniTime

- New room capacities
- New sections added (where applicable)
- Room requirements updated
- Course timetabling re-done using fixed-time MPP
- Continuing students re-batched together with incoming students
 - Students will keep the courses they were already enrolled in
 - Preferences set to keep as many sections as possible
- Students will be able to make changes after the new schedules are published





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Thank you!

Tomáš Müller

muller@unitime.org

Purdue University

More about UniTime: Using UniTime to improve institutional efficiency
on Wednesday at 9:10 AM EST / 3:10 PM CEST

For more details about UniTime, see <https://www.unitime.org>

