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1 class Course():
2     """An instance represents an offering of a course at Cornell. There
3     is a separate Course instance for each semester in which a course
4     is offered. Each course also keeps track of the students who are
5     enrolled.
6
7     Instance variables:
8         title [str] -- title of course
9         credits [int] -- number of credits
10        students [list of Student] -- students enrolled in course"""
11
12    def __init__(self, title, credits):
13        """A new course with the given title and number of credits.
14        The course starts out with no students enrolled.
15        Pre: title is a string (e.g., 'CS1110: Awesome Python')
16            credits is a positive integer"""
17        self.title = title
18        self.credits = credits
19        self.students = []
20
21
22    class Schedule():
23        """Instances represent a student's schedule for one semester.
24
25        Instance variables:
26            student [Student] -- the student whose schedule this is
27            semester [str] -- the semester this schedule is for
28            courses [list of Course] -- the Courses in this schedule"""
29
30        def __init__(self, student, semester):
31            """Schedule for <student> in <semester>. Starts with no courses.
32            """
33            self.student = student
34            self.semester = semester
35            self.courses = []
36
37        def total_credits(self):
38            """Return: the total number of credits in this schedule."""
39            total = 0
40            for course in self.courses:
41                total += course.credits
42            return total
43
44        def overlaps(self, other_schedule):
45            """Return: True if this schedule contains any course with the same
46            title as a course contained in <other_schedule>.
47            Pre: other_schedule is a Schedule."""
48            for course in self.courses:
49                if other_schedule.contains_course(course):
50                    return True
51            return False
52

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53    def contains_course(self, query_course):
54        """Return: True if this schedule contains a course with the same
55        title as <query_course>."""
56        for course in self.courses:
57            if course.title == query_course.title:
58                return True
59        return False
60
61
62    class Student():
63        """Instances represent students at Cornell. For each student, we
64        track their schedules for each semester they've been at Cornell.
65
66        Instance variables:
67            name [str] --- Name of student
68            schedules [list of Schedule] -- the student's schedules from all
69            semesters, in reverse chronological order. Schedule for the
70            current semester is at position 0 in this list."""
71
72        def __init__(self, name):
73            """A new student named <name>, who starts with no schedules.
74            Pre: <name> is a string."""
75            self.name = name
76            self.schedules = []
77
78        def start_semester(self, semester):
79            """Set up for a new semester by adding an empty Schedule at the
80            head of the schedules list.
81            Pre: <semester> is a string, such as '2018sp'"""
82            self.schedules.insert(0, Schedule(self, semester))
83
84        def add_course(self, course):
85            """Add a course for the current semester. This means the course
86            is added to the student's current schedule, and the student is
87            added to the enrollment of the course.
88            Pre: <course> is a Course, the student has a current schedule, and
89            <course> is not already on current semester's schedule."""
90            # TODO: implement this method
91
92        def validate(self, credit_limit):
93            """Return: True if the student's schedule for the current semester
94            is valid, which means that
95            (a) the total number of credits in current semester is not over
96            <credit_limit> (credits from prior semesters don't matter)
97            (b) student is not taking any courses in current semester that
98            they already took in a previous semester. Course titles
99            determine when a course is repeated; see Schedule.overlaps.
100           Pre: credit_limit [integer] ; student has a current schedule."""
101            # TODO: implement this method
102            # Take the time to read through all the methods in Schedule:
103            # using them makes this method much shorter to implement.
104

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105
106 def test_enrollment():
107     """Test the enrollment system, making sure particularly that
108     validation of schedules works properly and that students get
109     enrolled in the courses that go on their schedules."""
110
111     # Four courses, offered in each of two semesters
112     c1_s18 = Course('CS1110: Awesome Python', 4)
113     c2_s18 = Course('CS2110: Jolly Java', 4)
114     c3_s18 = Course('CS4740: Natural Language Processing', 4)
115     c4_s18 = Course('CS4620: Computer Graphics', 3)
116     c1_f18 = Course('CS1110: Awesome Python', 4)
117     c2_f18 = Course('CS2110: Jolly Java', 4)
118     c3_f18 = Course('CS4740: Natural Language Processing', 4)
119     c4_f18 = Course('CS4620: Computer Graphics', 3)
120
121     # A student whose course enrollment validates OK
122     s1 = Student('Lillian Lee')
123     s1.start_semester('Spring 2018')
124     s1.add_course(c1_s18)
125     s1.start_semester('Fall 2018')
126     s1.add_course(c2_f18)
127     assert s1.schedules[1].contains_course(c1_s18)
128     assert not s1.schedules[1].contains_course(c2_f18)
129     assert not s1.schedules[0].overlaps(s1.schedules[1])
130     assert s1.schedules[0].total_credits() == 4
131     assert s1.validate(5)
132
133     # A student who is trying to re-take a course
134     s2 = Student('Steve Marschner')
135     s2.start_semester('Spring 2018')
136     s2.add_course(c1_s18)
137     s2.start_semester('Fall 2018')
138     s2.add_course(c1_f18)
139     assert s2.schedules[1].contains_course(s2.schedules[0].courses[0])
140     assert s2.schedules[1].overlaps(s2.schedules[0])
141     assert not s2.validate(5)
142
143     # A student who is trying to take too many credits
144     s3 = Student('Mary Pisaniello')
145     s3.start_semester('Fall 2018')
146     s3.add_course(c1_f18)
147     s3.add_course(c2_f18)
148     s3.add_course(c3_f18)
149     s3.add_course(c4_f18)
150     assert s3.schedules[0].total_credits() == 15
151     assert not s3.validate(18)
152
153     # Check that s1 & s2 are enrolled in c1_s18
154     assert set(c1_s18.students) == set([s1, s2])
155     # Check that s1 & s3 are enrolled in c2_f18
156     assert set(c2_f18.students) == set([s1, s3])

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157
158
159 if __name__ == '__main__':
160     test_enrollment()
161
162

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