Enclosure 1: MOOC Portal Features

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This is a non-exhaustive list of important features available in NPTEL's current MOOC portal. Write to murali@nptel.iitm.ac.in if login credentials are needed to see the portal as a user.

1. Course Content

1.1.   Links to video lectures

1.2.   Self assessment questions below every video which may be in any of the question formats described above.

1.3.   Text transcripts or notes related to the video

1.4.   Additional video links related to the lecture

1.5.   Provision to "Ask a question" below every video by stopping the video at any second which gets posted on the Discussion forum.

2. Assignments

The nature of the courses offered varies widely and along with this, so does the number of enrollments and hence active learners in the course. Hence we require at least all of the following types of assignments to be supported.

2.1 Autograded Assignments

2.1.1.   Multiple choice questions, with number of choices being configurable. - having one correct option

2.1.2.   Multiple select questions, with number of choices being configurable - with more than one option being correct. The course instructor has the option also of choosing to award partial marks if any of the correct choices are chosen and no incorrect option is chosen or say there are no partial marks.

2.1.3.   Short answer (fill in the blank) questions - These questions can take in text typed by the user. Can be of the following types:

       2.1.3.a.   Numeric : where only numbers can be entered as answers, positive, negative, decimal and also scientific notation involving e. The answer can be validated in one of the 2 ways.
- The answer can be matched exactly to the value set.
- Marks will be awarded if the answer falls within a configured range whose lower and upper limits are set.

       2.1.3.b.   Alphanumeric: a-z,A-Z,0-9 and special characters are accepted. The answer entered is evaluated in 2 ways with the option being whether the match has to be according to rules of case or not.
- The answer can be matched exactly with a particular string.
- The answer can be matched with a set of strings that are defined such that any of the answers get matched, the learner is awarded marks.

2.2 Programming Assignments

A significant fraction of the online courses is Programming courses based on languages such as C, C++, Java, Haskell programming and Python. These are also courses with largest

enrollments and the learning in these courses is complete without hands on programming component. Hence the portal should be able to support the following:

2.2.1.   A programming platform that is part of it

2.2.2.   Programming coursework can be submitted in 4-5 programming languages and the backend should have the capability to execute them automatically. This should support atleast C, C++, Java, Python and Haskell. It should be extendable to any software that has a command line execution.

2.2.3.   Autograding of code submitted by the user should be possible.

2.2.4.   The auto evaluation is done in the following manner:
   a. Public test cases that help validate the code by showing the input given, expected output and the output got from the user's program
   b. Private test cases, that comprise input and expected output, which is kept hidden from the user, against which the program is evaluated. Scoring is applied only against the private test cases.

2.2.5.   To evaluate time of execution, test cases have a very large input size. An input size of up to 5 MB or so needs to handled by the grading engine and platform.

2.2.6.   There should be the option of pre-defining a prefix code and a suffix code and allowing the learner to plugin code only where required such that during code compilation and execution, the entire code is taken, including the prefix and suffix part.

2.2.7.   Provision for course instructor to be able to see which private test cases pass and fail to confirm if the setting of the test cases and hence the question is correct.

2.2.8.   Provision for timeout of execution while grading. The timeout must be a parameter that can be set by the course administrator.

2.2.9.   The platform should integrate well with the programming grader for executing user written programs.

2.3 Subjective Assignments - Manual Grading

2.3.1.   For courses that require assignments in the form of essays, reports or derivations and case studies that include graphs, etc, the option of uploading of a document in pdf/jpg/doc/xls format must be available.

2.3.2.   Also the provision of including multiple email ids which can be used for accessing the allocated assignments is required.

2.3.3.   Multiple submission mode of assignments should be possible with the last submissions distributed equally among the mentioned email ids.

2.3.4.   Provision to view the allocated assignment and enter score for the email id should be possible.

2.3.5.   A summary status of the evaluations being done should be available for the course instructor.

2.3.6.   There must also be a way to upload scores for select/all the candidates in one shot

2.4 Peer Review Assignments

This is a method where assignments submitted by learners are not corrected by the faculty team but by the learners themselves.

2.4.1. Learners should be able to upload an assignment document.

2.4.2. The course instructor should be able to set the number of reviews required per document.

2.4.3. System should allocate submissions as per the number specified as and when submissions are made.

2.4.4. Learners should be able to grade the assignments by giving a score and feedback.

2.4.5. The score and feedback should be visible to the person who submitted it.

2.4.6. Course instructor should be able to monitor the number of submissions received as well as those evaluated and also view anyone's submissions and review.

2.5 Other Essentials Common To Assignments

2.5.1. Entry of mathematical symbols through the use of **Latex** must be available as most engineering courses questions involve this.

2.5.2. The option to test the assignment completely must be available to the course instructor before it becomes live to the learners.

2.5.3. The due date of the assignment must be configurable and editable by the course instructor at any time.

2.5.4. As soon as the assignment closes, the last submitted autograded assignment should be evaluated and scores displayed to the learner.

2.5.5. All the correct answers set by the instructor and selected by the learner should also be made visible as soon as the assignment closes.

2.5.6. The number of submissions of the assignment should be a configurable parameter such as Single or a specific number or multiple.

2.5.7. Negative marking should be a possibility in all above assignments.

2.5.8. The assignment should be uneditable once it goes public except to the Superadmin of the portal.

2.5.9. Also, if any assignment has any issues with respect to any questions or answers being set incorrectly, the option to make the correction and re-evaluate should be possible.

2.5.10. The assignment scores of all learners in the course must be available for download in a suitable format for the course instructor.

2.5.11. The option for the SuperAdmin to have a view of the answers submitted by any candidate by getting access to his view of the assignment is an important feature to resolve any queries raised by the candidate.

2.6 Important features for the content and assignments

2.6.1.   After uploading the video content and allied material as a course instructor, it should be possible to test the same from the view of a student without making the contents live.

2.6.2.   After configuring the assignment too, it should be possible to plug in answers, check the score obtained as a student and verify the correctness of the same before making it available to the learners in the course.

2.6.3.   It should be possible to add/modify content (either videos/assignments/any other material) from the Super admin role for a week that has passed by or for an ongoing week.

3. Integrating new tools required as course learning aids

NPTEL offers engineering courses primarily, many of which require the support of tools such as Matlab (a Mathworks product), Verilog which is a tool used for circuit designing, etc. The portal should be able to support the integration of such tools also so that students do not learn just theory but are able to do some hands on work too.

The licenses and agreements for any external software will be provided by NPTEL and are to be used only for NPTEL courses.

4. Roles on the portal

Management of the portal is a crucial aspect and requires several roles to be defined, that have different permissions and access to data.

4.1 Super Admin

The portal must have a Super Admin having overall control of the portal and all courses on it. The following will be the capabilities of the super admin.

4.1.1.   Only entity who can create and delete courses on the portal

4.1.2.   Assigns the course admin for every course

4.1.3.   Can access/edit all the data related to every course.

4.1.4.   Has a dashboard to view the basic data across all courses

4.1.5.   Controls some features such as opening of scholarships, mentor assignment, re-evaluation of assignments, addition of spoc information for local chapters etc

4.1.6.   Force-enroll candidates who have withdrawn by accident should also be available.

4.2 Course instructor

The Course instructor has permissions for the course that he is admin of. Following will be the data and permissions available to this role.

4.2.1.　　　Creating the course intro page
4.2.2.　　　Adding additional course admins if required
4.2.3.　　　Creating the announcement and discussion forum groups associated with the course
4.2.4.　　　Controlling the open and close dates for enrollment
4.2.5.　　　Addition/modification of the units/lessons that form the content of the course
4.2.6.　　　Addition/modification of the assignments put out in the course
4.2.7.　　　Permission to put out announcements in the course, which will also be sent out as emails to each student
4.2.8.　　　Ability to moderate the forum
4.2.9.　　　Access to statistical data related to the course - such as the following:
   a. the profile details of the learners enrolled,
   b. the assignment marks obtained candidate wise,
   c. the question wise answers entered by each candidate for each assignment
   d. Analysis of the answers entered by the students and choices opted for
   e. The video watching patterns
   f. Tracking and supervising the assignment correction in case of subjective assignments and peer review assignments

4.3 Course Learner

4.3.1.　　　The learner should be able to enroll to any course with a valid email id and once enrolled get access to the contents of the course such as the videos, assignments, announcements and discussion forum.
4.3.2.　　　The learner should be able to participate in the forum posting queries and replies.
4.3.3.　　　The forum should also be accessible and connected to email if the learner wishes to do so.
4.3.4.　　　The announcements should be received as email by the learner.
4.3.5.　　　The learner should be able to see his/her scores obtained for every assignment submitted, after the assignment due date.
4.3.6.　　　Learner should be able to withdraw from any course any time during or after the course run.
4.3.7.　　　If mentors are available for a course, learner should be able to attach himself to a mentor.

5. Local Chapter SPOC

NPTEL works with colleges across the country and every such college that has an NPTEL Local Chapter has a coordinator designated as Single point of contact or SPOC for NPTEL. The Super Admin has the privilege of adding new Local Chapters and the SPOC email ids on the portal.

The SPOC of every Local Chapter has a login on the portal that allows him/her to access data relevant to participants from his college, which are as follows:

    5.1.   The SPOC can see the list of participants from his college and their basic information - if they have declared themselves as belonging to this particular Local Chapter during enrollment.

    5.2.   The SPOC can view course wise list of participants and assign faculty members in each to be a mentor for the course.

    5.3.   The SPOC can also apply for fee waiver for students coming from economically weak backgrounds if NPTEL has the funds to support the same.

    5.4.   The above data can all be downloaded as csv or pdf as desired.

    5.5.   The above data is dynamically updated as it happens on the portal.

6. Mentors

This is a feature open only to NPTEL Local Chapters. Colleges that wish to mentor their students and monitor their progress in assignments can assign faculty members in the same domain as mentors in a particular course. These mentors also have to enroll to the course.

When students attach themselves as mentees to these mentors, the mentors can see if a student has submitted an assignment when it is open and also view their scores when the due date is crossed and the assignment score is available.

Mentors should be appointed by the SPOC - course wise on the portal.

7. Enrollment page and details

The enrollment details collected on the portal should be customizable as required. Currently NPTEL Local Chapter feature is a part of the enrollment details where the candidate, if faculty/student, is asked if they belong to a Local Chapter. If yes, once the candidate selects the actual state and city, the Local Chapters available in that city are shown in a dropdown list and additional details are collected such as College roll number.

A Welcome Email goes out to every user when he/she enrolls to a course with data that is configured for that course.

7.1 Editing of the profile

The enrollment details should also be editable in case the user wants to update his information for the same email id.

7.2 Force enroll feature

Sometimes learners withdraw from a course without realizing they have done it. We need to enroll them back if they so wish. This should be such that they have been earlier enrolled to the same course with the same email id in the current course run - this feature can be available at the Super Admin level and needs to be done without opening the enrollment on the portal for all users.

7.3 Announcements to learners

The portal should be capable of sending announcements to all learners of a course or a provision to send the same to learners across courses as a post on the course page as well as an email.
Also it should be possible to create the announcements for all weeks ahead and keep them private, to be sent as required.
Cloud charges should not be applicable for this feature.

7.4 Live interactive sessions with learners

The portal must also have the capability to facilitate live interaction between the Course instructors and the users - in the form of live chat that is in typed format or in the form of video (face-face) interaction.
Cloud charges should not be applicable for this feature.

7.5 Test courses/whitelisted courses

The portal should support courses that are private and not visible to the world - so that we can use it for testing new features, to use it to train new associates who join the team or to test new feature implementations before the feature is made available to the general public.
The portal should also allow for courses that can be configured by the Course admin to be available for a certain group of people and not available to everyone. This is very important when some content needs to be put as a trial run or when offering a course to a closed group of candidates.

7.6 Addition of new features that are compatible with new initiatives of NPTEL on request

The design of the portal should be flexible enough such that new features can be incorporated as the need arises - be it in the UX of the site, or addition of new features, modification of existing features with respect to new tools, content delivery or assignments or any other learner interaction aspect.