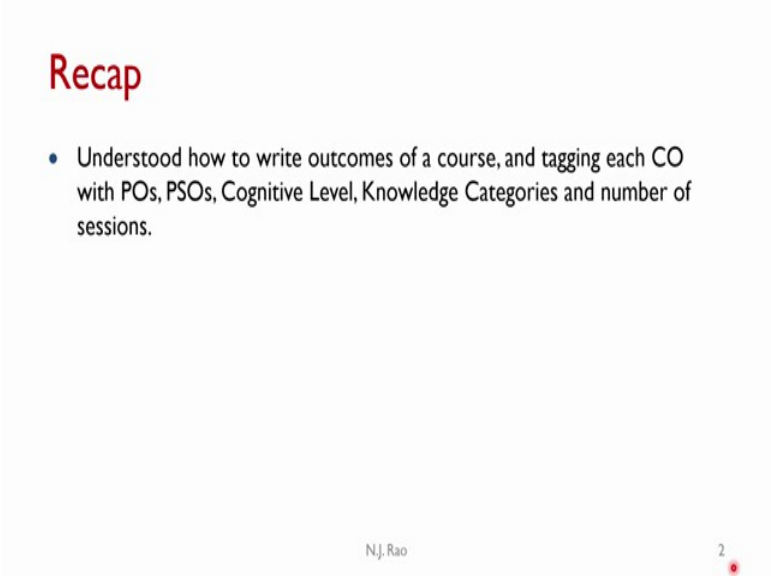
Teaching and Learning in General Programs (TALG)
Prof. N. J. Rao
Department of Electronics Systems Engineering
Indian Institute of Science, Bengaluru

Lecture – 18
Attainment of Cos

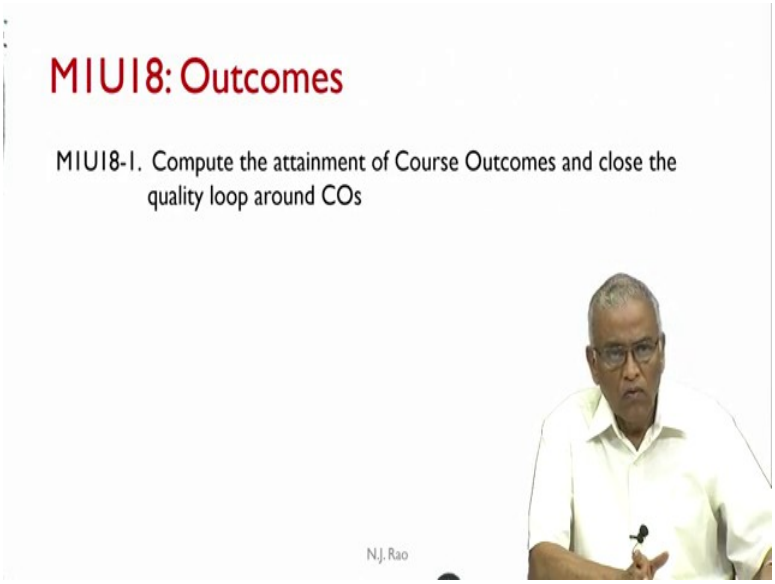
Greetings and welcome to unit 18 of module 1 of TALG.

(Refer Slide Time: 00:39)



In the earlier unit, we understood how to write outcomes of a course and tagging each course outcome with the addressed POs and PSOs, cognitive level, knowledge categories and the number of classroom sessions. Preparing the right kind of COs is the core point of a module one that is OBE.

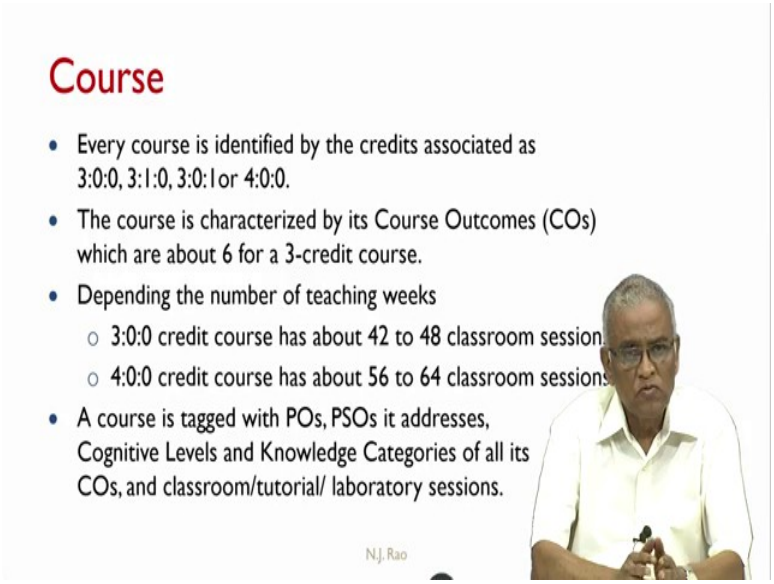
(Refer Slide Time: 01:08)



Just writing course outcomes may or may not help either the students or the faculty, we need to find out to what extent they have been attained. You want to do something, that is your intention and the students read and study and they write exams, but in the process have they really attend the COs?

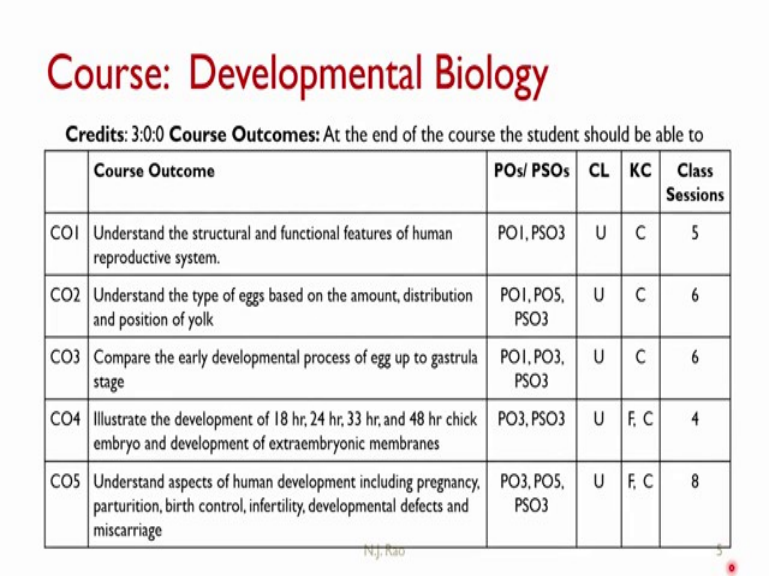
To meet the NAAC requirements, we compute the attainment of course outcomes and using this course outcomes we close the quality loop around COs. (Quality loop, explained in the earlier units). we will actually now find out how to close this quality loop.

(Refer Slide Time: 02:13)



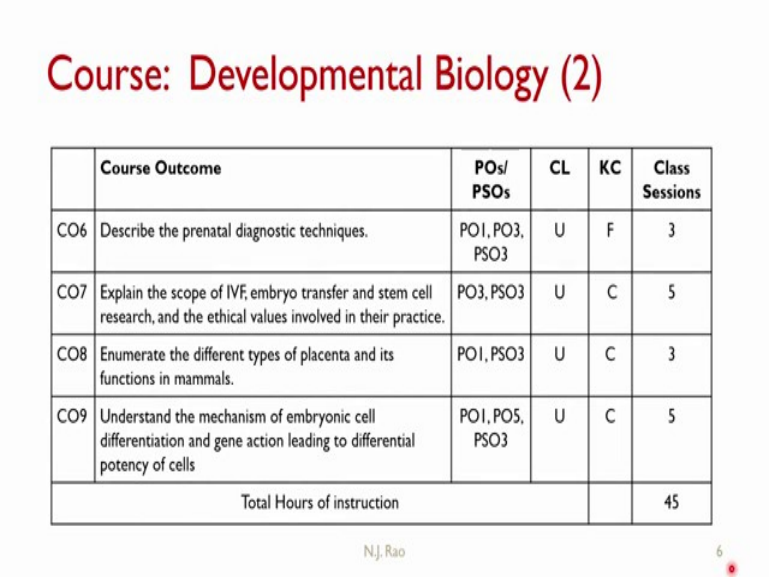
Reviewing: If you take from a course perspective, every course is identified by the credits associated either as 3:0: 0, 3:0:1 or 4:0: 0, and as we have seen in case of some courses, it can also be 5:1: 0 and so on. As far as a 3 credit course is concerned, we write about 6 course outcomes per course, it can be 8, 7 or 5 and occasionally it may also drip towards 9. We should not write too small a number nor too big a number. And depending on the number of teaching weeks a 3 credit course has about 42 to 48 classroom sessions; correspondingly a 4 credit course has about 56 to 64 classroom sessions. On this, while the university or the institute decides the number of teaching weeks, but 3 credit course means has to be between the 42 and 48 classroom sessions. And a course is tagged with POs and PSOs it addresses.

(Refer Slide Time: 03:50)



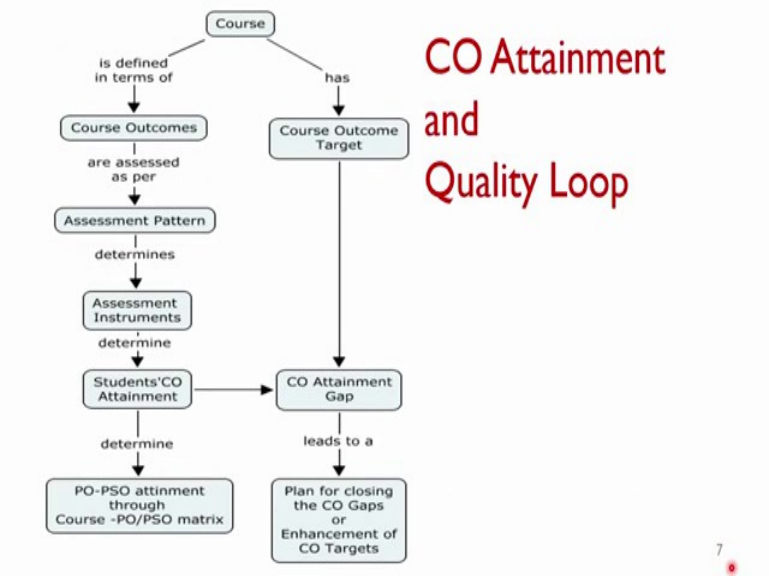
We showed an example of a course on developmental biology, where in we wrote all the COs and identified the POs and PSOs the course addresses, the cognitive level associated with each CO and knowledge categories associated with each CO and the number of classroom sessions.

(Refer Slide Time: 04:18)



As we have seen there were 9 here and it adds up to 45 sessions - the numbers of class sessions are not necessarily the same for all COs.

(Refer Slide Time: 04:32)



Now, what do we understand by the attainment of quality loop? Here is a course and course has several course outcomes and then first thing is to what extent I have to setup a target for attaining these course outcomes? Of course, all students will not attain the 100 percent performance, and in a class we have a mix of students and also we have other resources issues. so, what we have to do is we have to setup a realistic target for each course outcome.

The highest reference can be 1 or 100 percent, whatever number you want to choose, let us say 100 percent is the highest. Then I will set up some reasonable target. Now have set a target, having identified course outcomes, the teacher conducts the class sessions or the instruction is performed and when these outcomes are assessed through an assessment pattern.

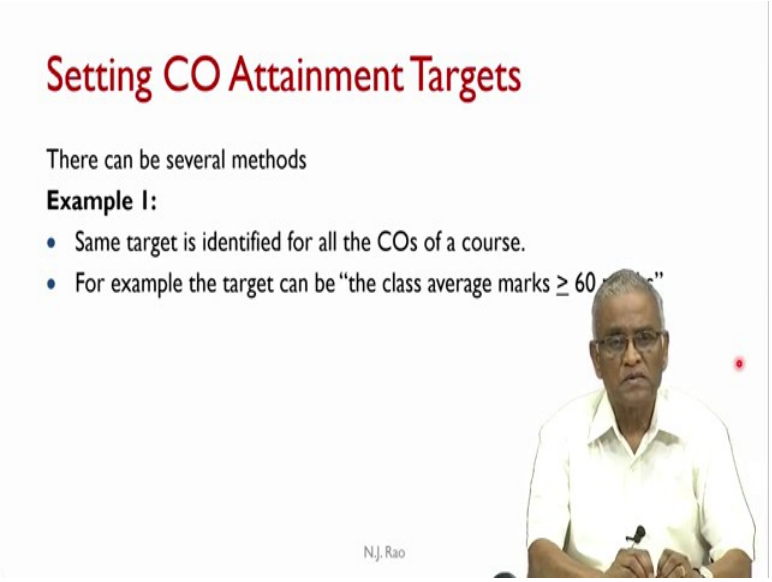
That means you choose to assess as per some declared pattern. And then assessment pattern will determine what kind of assessment instruments that we are going to use. We can refer assessment instruments like test papers or the end semester exams and so on. And the assessment instruments, in turn determine the students CO attainment. From the course, you have course outcomes, identify an assessment pattern and then correspondingly design test assessment instruments, and the student performance in the assessment instruments are combined together into a some kind of a number and this number is compared with the target. So, if the entire class met the target. The gap in the

CO attainment will be 0, but we generally set a target that is proposed to be attained, but not actually attainable. So, there could be some gap between target and the actual performance of the students and this CO attainment gap should lead to a plan for closing the CO attainment gaps.

That means you find that the students have not performed that well with respect to one CO and as a teacher you would know what has transpired in the classroom or where the students are likely to have difficulty. Then based on your experience in the classroom, you create a plan for closing the loop; that means, I want next batch of students to perform better in meeting the target. Sometimes, we actually meet the target. The students actually perform well to meet the target or you may exceed the target. in such case, what do you do? Enhance the target.

So, the whole purpose of the closing the quality loop is that over a period of time, because as a teacher, I understand the subject matter with regard to the abilities of my students and the resources. I can continuously improve their performance. So, that over a period of time, I am continuously improving. This continuous improvement is one of the goals of any accreditation process. The department or the program should demonstrate, that it is continuously working to improve the performance of the students. In addition, the student CO attainment in turn will determine the PO, PSO attainment through PO-PSO matrix.

(Refer Slide Time: 09:54)



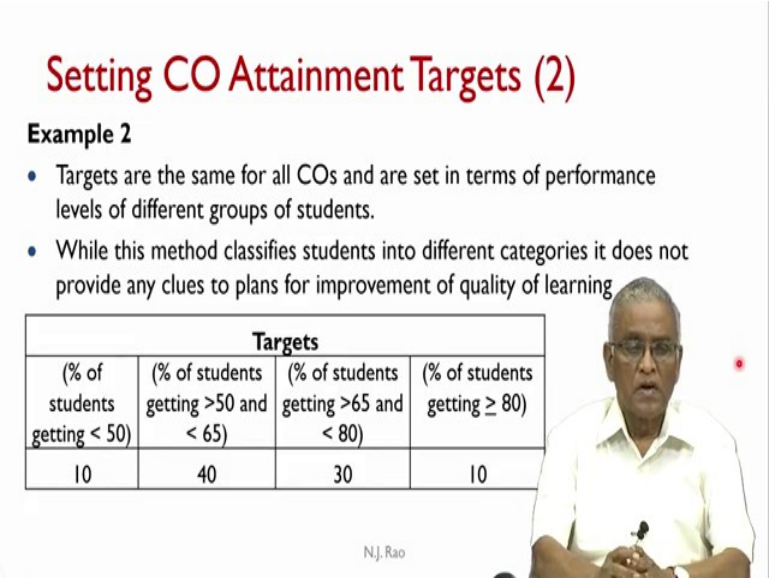
How do I set my target? For measurements of this attainment, there is no universally accepted, agreed method of either setting the target or computing the attainment of the target. So, there can be several ways of reasonably, correctly doing. There is nothing like an absolute way.

We present you some methods. The institute or the college will select an appropriate method or what they consider is appropriate for their situation. And then follow it across all programs in the institute. You cannot have for one course one method and another course, another method or one program one method like that, that will lead to lot of internal differences which is not healthy. One should remember, there is nothing like an absolute correct method or specific method that needs to be universally followed.

You follow a reasonable method which not to detailed or not to gross but follow it consistently, that is what is more important. By following it consistently, you will be able to keep track of to what extent we are continuously improving.

Example 1: "same target is identified for all the COS of a course". For example, the target can be that the class average marks should be greater than or equal to 60 marks; that means, I am not interested in individual COs. I just pick up one target; my student should be able to perform better than 60 percent.

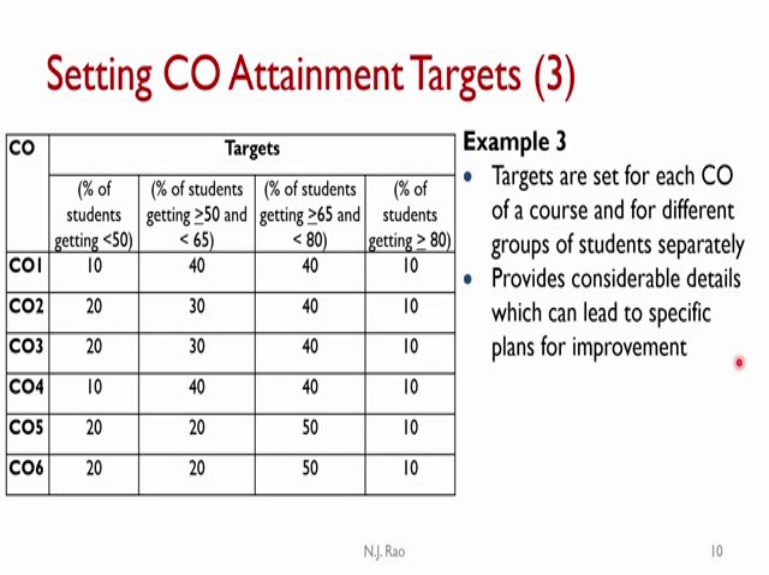
(Refer Slide Time: 12:06)



Example 2: “targets are the same for all COs and are set in terms of performance level of different groups of students, As we always expect certain distribution of students in terms of their abilities are they are likely to perform differently, but I want a reasonable distribution for example, percentage of students getting greater than 80 percent should at least be 10.

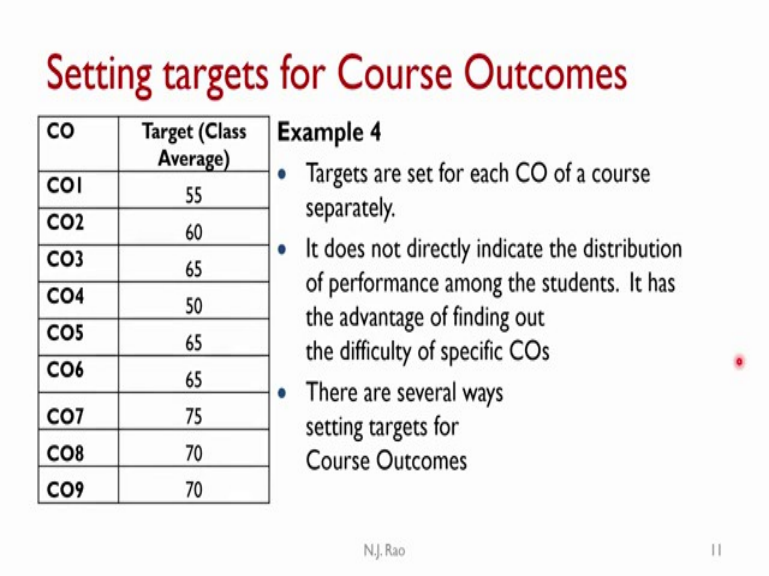
Percentage of students getting, between 65 and 80 is 30. Percentage of students greater than 50 and less than 65 is 40. Percentage of students getting less than 50 is 10 (and of course, this 10, 40, 30 and 10 is a sorry, this does not add up to 100, but you can correspondingly adjust the numbers) and let us say a 10, 40, 40 and 10. So, one has to be that is that is the way, I am expecting the distribution of students in terms of their performance.

(Refer Slide Time: 13:34)



Example 3: I have different targets for different course outcomes and also distribution of students. So, this is much more complicated much more detailed. It can be done using today’s available software tools, any kind of mechanism that you can choose and it will compute the performance of the students accordingly and gives you the table.

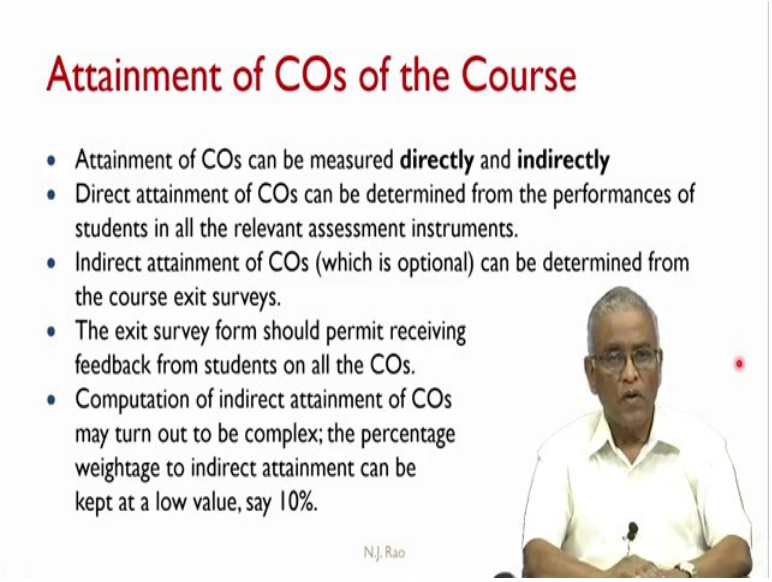
(Refer Slide Time: 14:23)



Example 4: targets are set for each CO of a course separately, because logic is, all COs are not necessarily of the same level of difficulty or complexity. Some may be merely descriptive and some may have a large number of concepts involved and lot of computational efforts is involved. You cannot expect the same performance from the students with respect to the entire COs.

So, here we identified the different targets for different COs. They vary anywhere from 75 to 55. But here we are not really indicating the distribution of performance among the students under different percentage performances. So, among these 4, after working with large number of groups of faculty, we find example 4- setting targets like this, individual targets for each CO has some amount of detail, and not too complicated to implement. So, this gives you sufficient amount of detail and yet manageable.

(Refer Slide Time: 16:02)



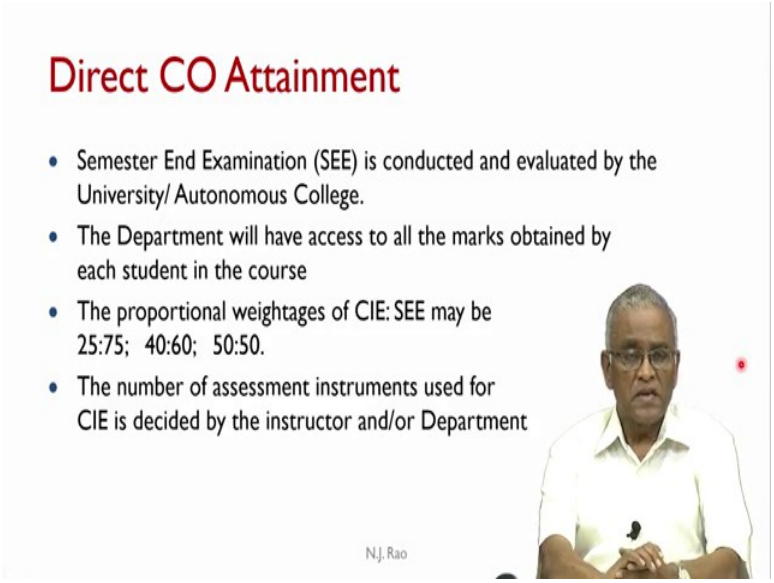
Assuming that we are following example 4 type of setting attainment targets. There is another issue attainment of COs can be measured directly and indirectly. The direct attainment of COs is determined from the performance of the students in all the relevant assessment instruments. As we already said, we are not proposing any different activities other than the routine assessment activities that are followed in an institute.

We are not trying to ask the students to write yet another test to find out whether they have attained the targets or not it will not work. So, direct attainment of COs is determined from the performance of the students in all the assessment instruments. Indirect attainment of COs, which actually is optional as per as NAAC accreditation is concerned, One need not include that, can be determined from the course exit surveys. This can be chosen by the faculty member to get feedback. The exit survey should be conducted in such a way that the teacher should be able to get feedback from the students on the entire COs that he is using.

You cannot ask directly have you understood the CO1 clearly or have you been able to perform well with respect to CO3. You have to ask based on the nature of the subject in such a way that you can conclude from there, the kind of performance the students felt while writing the tests. In some sense you are getting the feedback in directly from the students on all the COs.

As the competition of this indirect measurement is complex, it is also indicative rather than exact, one cannot give a high weightage to indirect attainment. We normally suggests about 10 percent is fine, 90 percent is for direct attainment and about 10 percent is for indirect attainment.

(Refer Slide Time: 18:58)



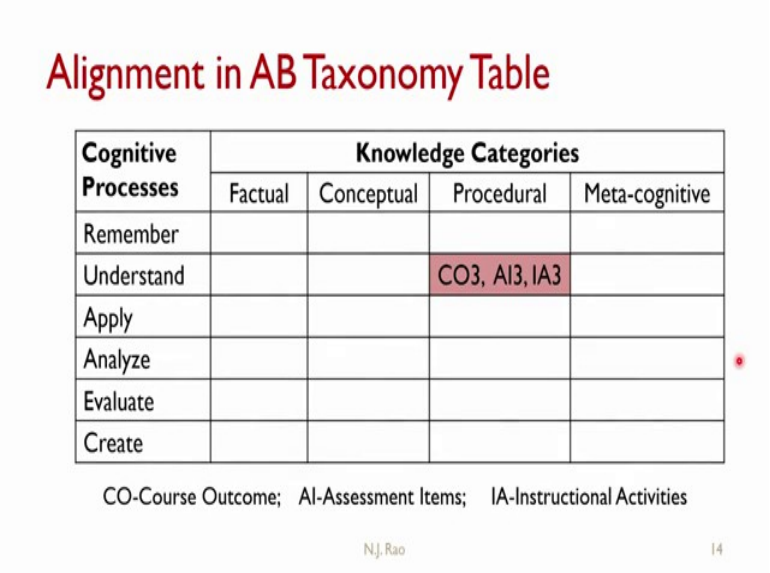
Direct CO attainment: We have several situations. Semester end exam is conducted and evaluated by the university, for all its affiliated college in a centralised manner or an autonomous college within that institute itself. So, you have several autonomous institutions in the country, but still as we mentioned that number of colleges, which are affiliated to university constitute still about more than 90 percent.

In the case of autonomous institution, the department will have access to all the marks obtained by each student in the course. The proportional weightage of CIE- continuous internal evaluation, versus semester end examination can be 25:75 or sometimes even 20:80, 40:60 or 50: 50; very rarely it exceeds 50:50. With respect to the semester end examination normally there is not much choice, there is one examination that is given for about 3 hours and the performance of the student in the 3 hour exam is taken to carry 50 percent of weightage.

But with respect to CIE the number of assessment instruments used is decided by the instructor and sometime by the department. Strictly speaking every teacher for every course can follow ones' own distribution of assessment instruments with respect to CIE

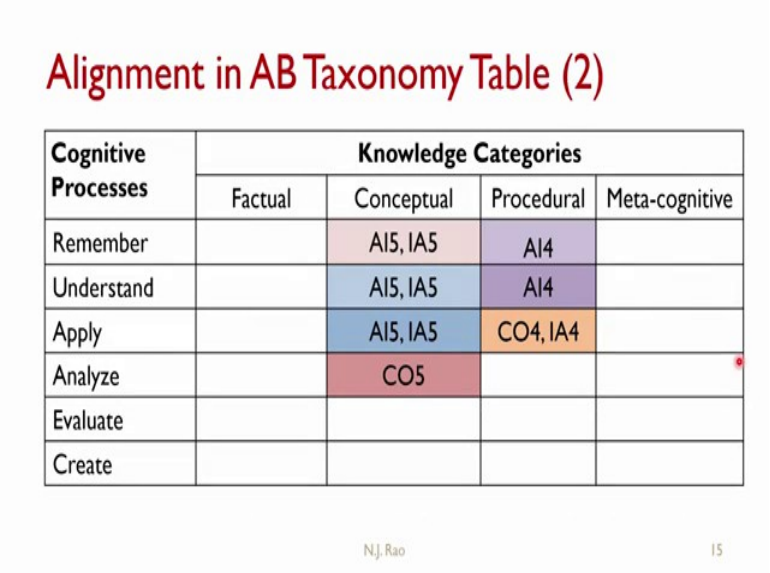
or a department may say every course in the department will have two tests and one assignment or three test out of which take average over three tests. There can be many variations with respect to the continuous internal evaluation.

(Refer Slide Time: 21:34)



We already mentioned about alignment in Anderson-Bloom taxonomy table. where a course outcome is located in a particular cell and the associated assessment instruments and instructional activities are also located in the same cell. This is called as the alignment.

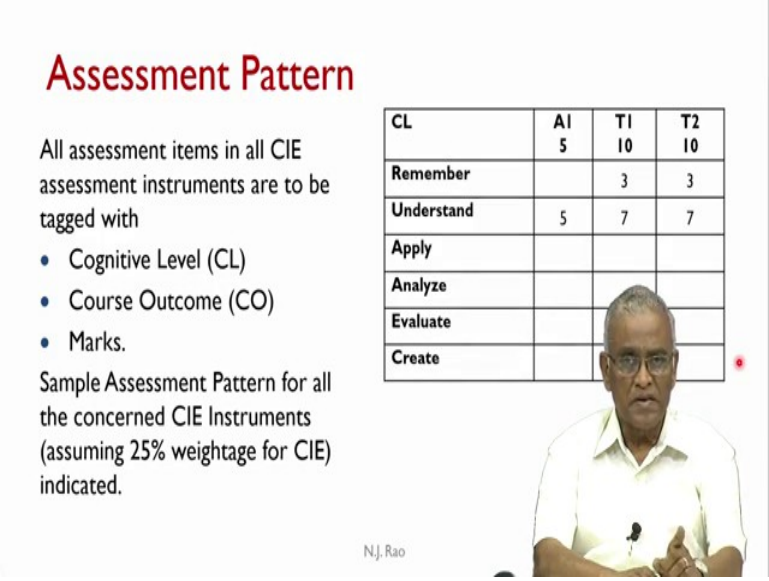
(Refer Slide Time: 22:13)



For example, take CO5; the way it is arranged is not acceptable, because CO5 is located in analyse, conceptual category and there is no assessment instrument in that particular cell neither the instructional activities are performed in that.

Whereas, CO4 instructional activity is located in the same cell, but none of the assessment instruments are in that. So, this also strictly speaking is not acceptable. The alignment issue should be resolved for example, take CO4, certain percentage of assessment items can be in CO4, and I can still have some assessment items in the lower cognitive levels as well. So, this is something that should be kept in mind while designing all your assessment instruments.

(Refer Slide Time: 23:37)



Assessment pattern. Any assessment item should be tagged (question or a assessment item, can carry either 1 mark or 2 marks or sometimes 5 marks or 10 marks, in some cases people also used 8 and 16 marks as well). So, every assessment item should be tagged with cognitive level, the course outcome and the number of marks. So if you want to implement OBE and if you also want to really establish that the course outcomes are actually attained by the students one requires tagging of all the assessment items with this.

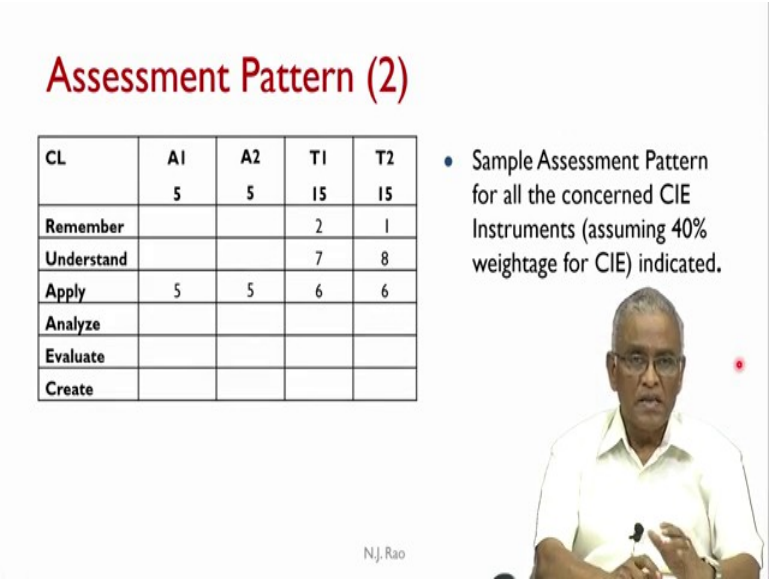
Internal evaluation let us assume, we take a simple case, where there is one assignment A 1 and then there are two tests T1 and T2 and the 25 percentage weightage that is given to continues internal evaluation is distributed like that. Assignment carries 5 marks, test 1

carries 10 marks and test 2 carries 10 marks and also the nature of the course here, for example, if you take the developmental biology, it is mostly remember and understand, there is not much that much you actually apply; that is the nature of the course.

5 marks are allocated to understand category. This is my choice again, I may still ask only 4 marks in the assignment for understand and 1 mark for remember. So, let us say assignment, we generally look at the highest cognitive level. So, 5 marks for that and 10 marks for test 1, I distribute it as 7 marks for understand, 3 marks for remember. Same thing I will follow test 2. For example, as a teacher you can choose a 2 and 8 or 1 and 9 or you can say 6 and 4 either way you can even chose.

So, there is enough variation possible here and the teacher can make his or her decisions based on the nature of the subject. That means, in test 1, I allocate seven marks out of 10 for questions related to understand from the relevant COs; that is what we mean by the assessment pattern.

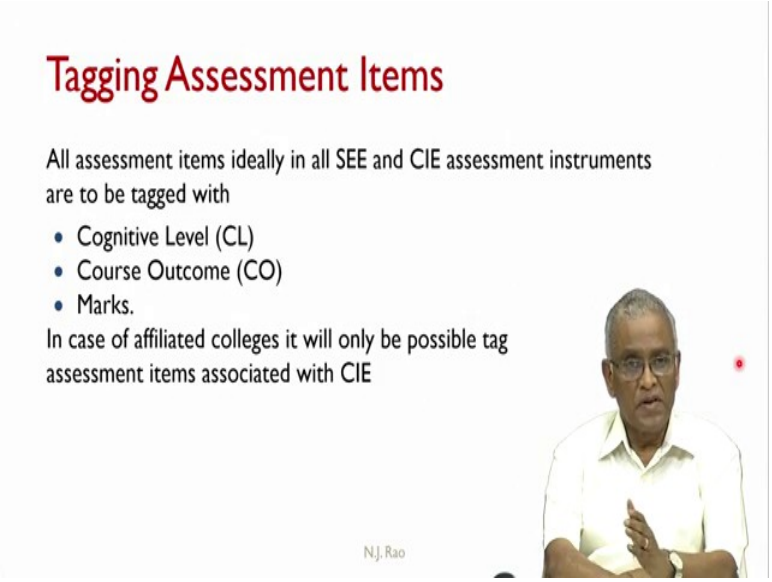
(Refer Slide Time: 26:55)



Example 2: where there is apply involved in that and here I have assignment 1, assignment 2, test 1 and test 2, which means I am talking about 40 percent weightage given to CIE. In test 1 the number of COs that I address are limited. Because we are talking about the initial part of the semester whereas, test 2 you have covered many more COs by the time. So, the distribution of marks can correspondingly depend on the kind of

COs and the kind of cognitive activities associated with them. So, here is an example, 2, 7, 6, where as for test 2 it is 1, 8, 6.

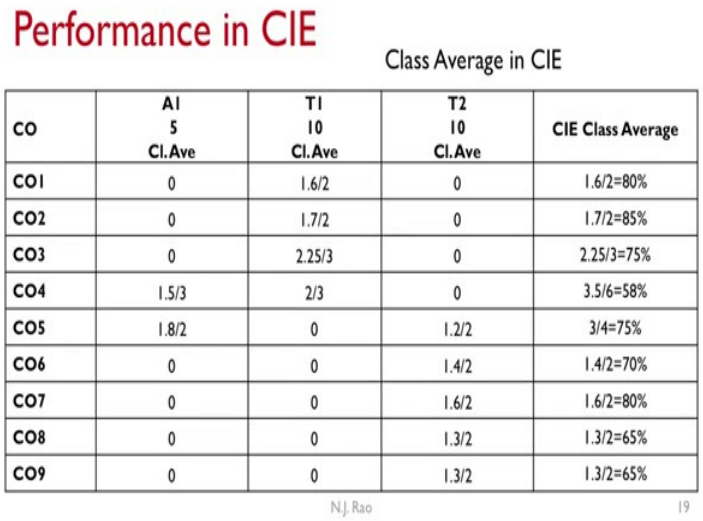
(Refer Slide Time: 27:55)



Ideally in all SEE and CIE instruments should be tagged. In the case of affiliated colleges the teacher can only a tag the assessment items associated with CIE unless the university decides to follow this method of tagging and also collecting the marks as per the CO.

Right now most of the universities do not follow this, because that is again a lot of activity and there is a lot of organisation that would be required to centrally manage the setting up of the exam with tagging all the questions and capturing the performance of the students at individual CO level.

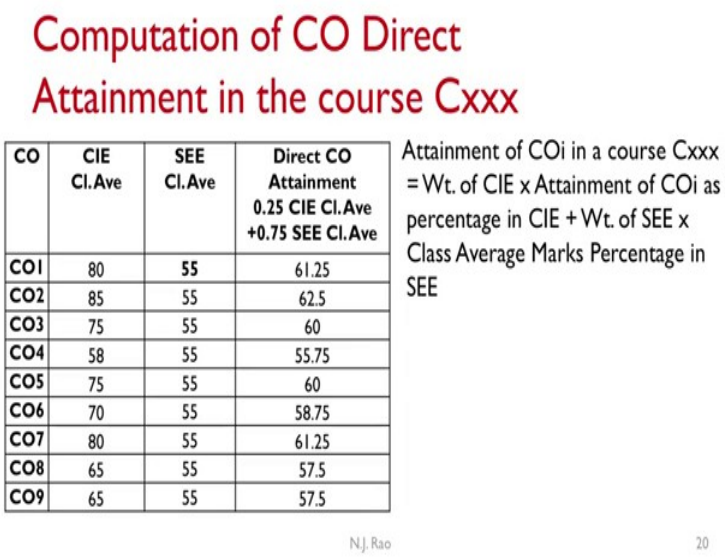
(Refer Slide Time: 28:50)



This is how the performance in CIE is taken in one example as, we have a 1 assignment and 2 tests. Up to test 1, we have covered 4 COs and the remaining 5 COs are covered in test 2, and performance of the students is here; 2 marks out of CO related to CO 1, the class average is 1.6.

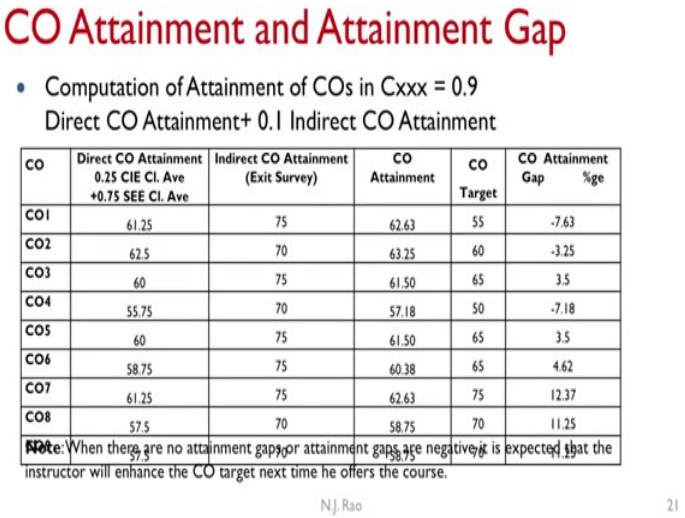
With respect to CO 2 it is 1.7 marks out of 2. Like that we compute and finally, we will add up horizontally, saying that with respect to each CO, this is the average performance of the class. So, as you can see when you combine with CO4, if you take 1.5 plus 2 that is 3.5 out of 6, that is 70 percent is the class average performance. While this looks too detailed and complicated, but once you get used to it, it is very simple arithmetic.

(Refer Slide Time: 30:30)



You combine the CIE performance with SEE performance. SEE performance, as details are not available, you take class average mark and consider all CO s are attained to the same one. Yes, it's not a very satisfactory situation, but it is all as we have, we consider the performance of the student is equivalent to class average across all COs and we take the same number- 55 that we got. And now you add these two based on the percentage weightage that you have. We have 25 percent weightage for CIE and 75 for SEE and you combine the two and produce the column, where the direct CO attainment is presented.

(Refer Slide Time: 31:37)

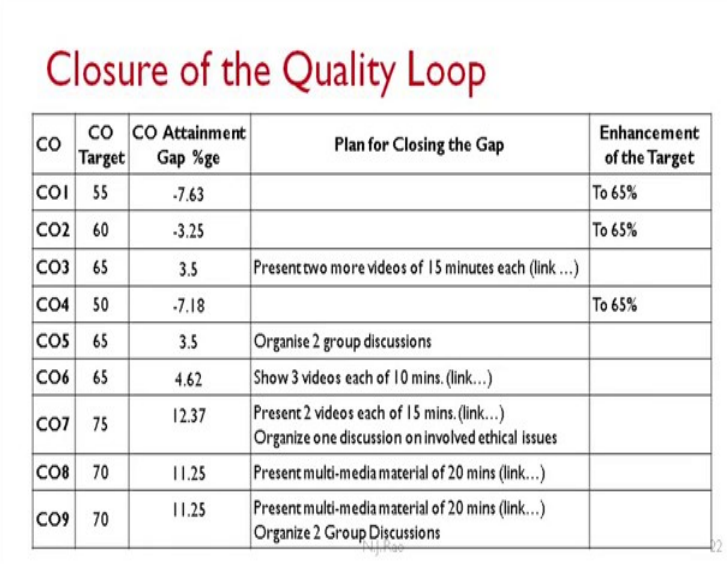


Compute: if you have conduct an exit survey and you got some feedback from the students, which again is translated into a performance as perceived by the students at the end of the semester and we add that percentage as indirect attainment in third column. Now these two are combined, 90 percent for direct attainment and 10 percent for indirect attainment, we combine the two and finally, get the CO attainment. We already have selected the target for each CO which is presented in the last but one column and the difference between the two is the CO attainment gap.

For example, CO1 the target is 55, but actually attainment is 62.63; that means, I have exceeded the target by 7 percent. So, that is why we show it as minus 7.63 as where ever we exceed the target we will show with a negative sign. CO 7 and CO 8 targets are much higher and the attainment gap is 12 percent, 11 percent and so on.

One need not worry very much about the second decimal places or even first decimal places. Some computation is done, actually you can round it off to just two integers also, there is absolutely you know no issue about it.

(Refer Slide Time: 33:39)

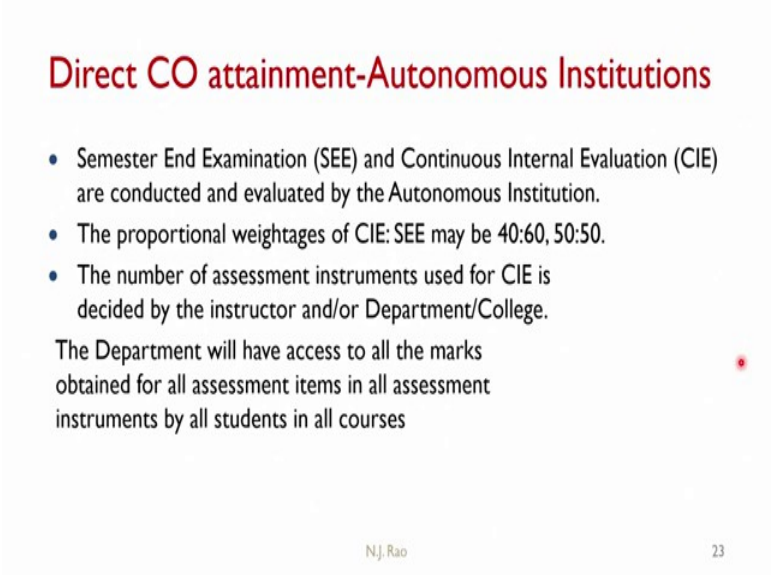


CO1 if you take CO target 55 CO attainment gap is minus 7.63. You have exceeded the target. So, I rise the target enhance the target to 65 percent. Same thing with CO2, target is 60; gap is minus 3.25 here also I rise the target to 65. Now coming CO3 the gap is 3.5, now the teacher will have to look at what exactly he or she has done with respect to CO3 and in the classroom, what have been the experiences, based on that you have to create a

plan for closing the gap (these are only samples). Present two more videos of 15 minutes each (by providing a link to that) either you present in the class or ask the students to take a look at this 15 minute videos or any other such activity. So, whatever you want to do those specific activities will have to be recorded here.

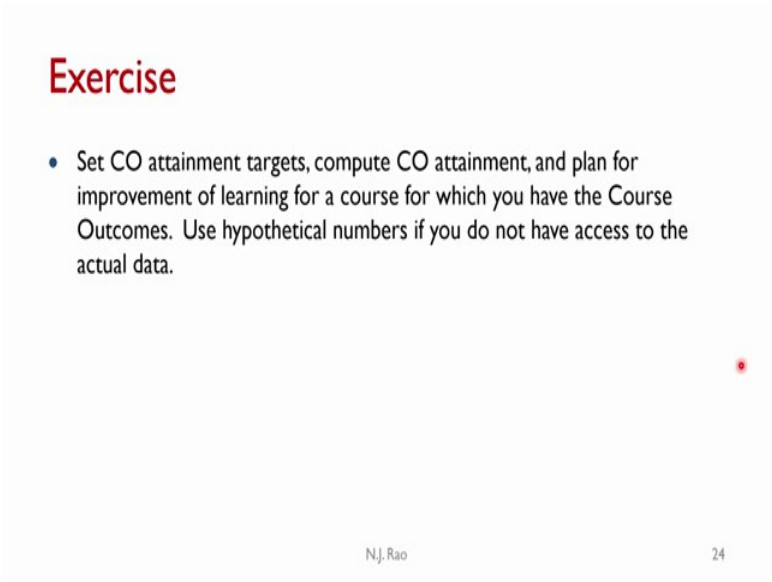
In the case of CO5 the gap is 3.5 you think that by organising group discussions I can improve the performance or you take CO8 the gap is 11.25. And here present multimedia material of 20 minutes, again providing some linkages or with respect to CO9, I not only present multimedia material, but I also organise group discussions. Of course, here we have given the samples, but it does not mean that for every everywhere there is a gap you have to follow on this method. It depends on the nature of the subject and also what the teacher feels about why such a gap exists.

(Refer Slide Time: 35:48)



In the autonomous institutions, where the department will have access to all the marks obtained for all assessment items in all assessment instruments, to their extent you do not have to use one number with regard to a SEE you can use exact numbers that are obtained by the students.

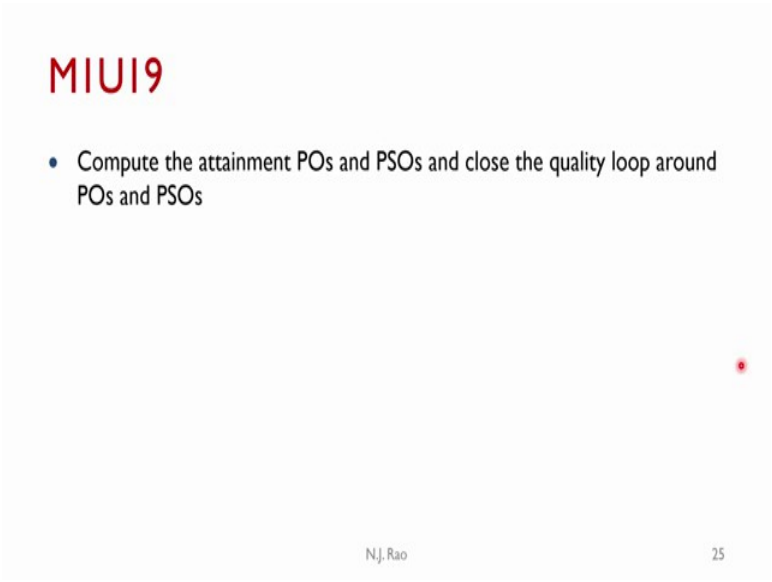
(Refer Slide Time: 36:10)



Now, as I said it looks and little more involved and messy, but the teacher is not doing anything other than tagging the every assessment item with cognitive level, marks and the CO, collect the data and also whatever marks that student has obtained for each assessment item, if that is recorded everything else can be automated.

Just for practice set CO attainment targets, compute CO attainment and plan for improvement of learning for a course for which you have the course outcomes. Whatever course that you have already prepared under the earlier units, you use those course outcomes and use hypothetical numbers, if you do not have access to the actual data. A little bit of practice along with a colleague, will just settle this particular issue.

(Refer Slide Time: 37:19)



In the next unit, we will compute the attainment of POs and PSOs, because ultimately you have to prove through all these courses that I am attaining the POs and PSOs that I have chosen and also close the quality loop around POs and PSOs.

Thank you very much.