NBA Accreditation and
Teaching – Learning in Engineering
(NATE)
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Lecture 24
ADDIE Analysis Phase-1

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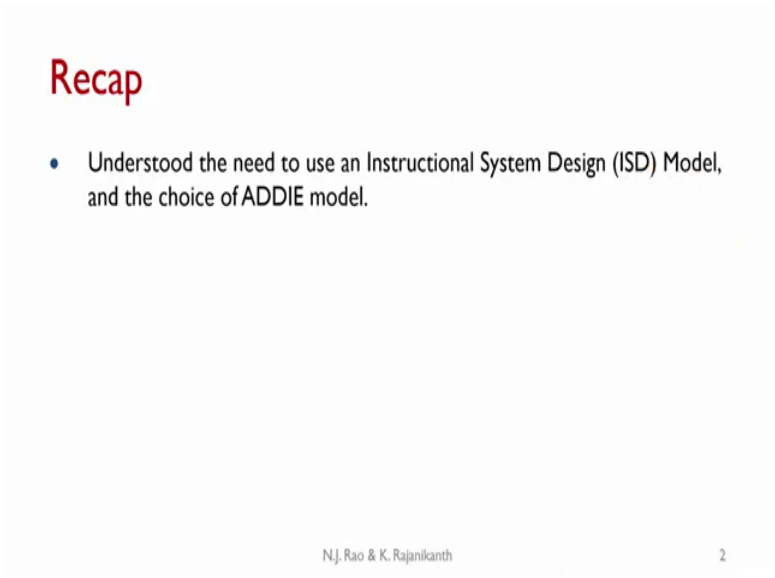

Greetings and welcome to module 2, unit 3 on Analysis Phase. In the previous unit, we looked at the instructional system design model of ADDIE and we had a brief glimpse about what each phase of ADDIE is.

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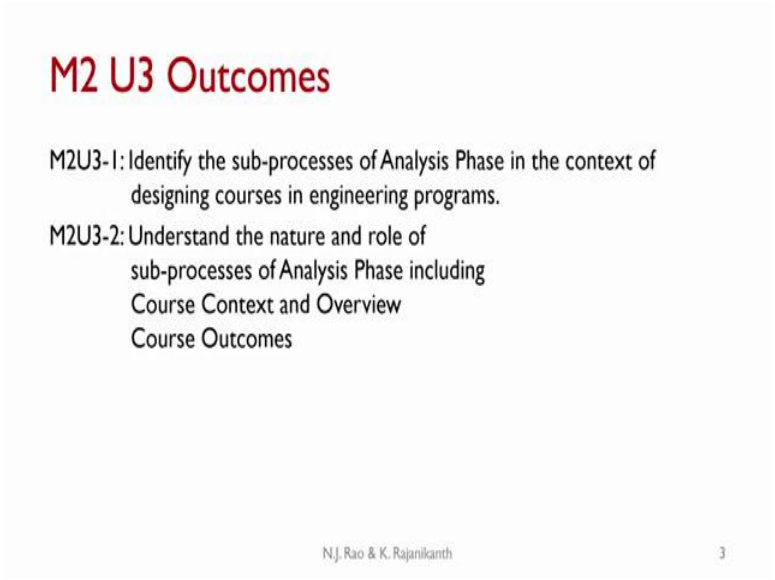

And now we will be looking at the analysis phase more in detail and this specifically will be addressing identifying the sub-processes of analysis phase in the context of designing courses in engineering programs. Please note that these sub-processes become specific to designing courses in engineering programs. With minor modifications, they can also be used if for designing courses in other types of programs.

And also we try to understand the nature and the role of sub-processes of analysis phase including course context and overview and course outcomes. These two are 2 sub-processes of analysis phase and we will be looking at how to follow this process.

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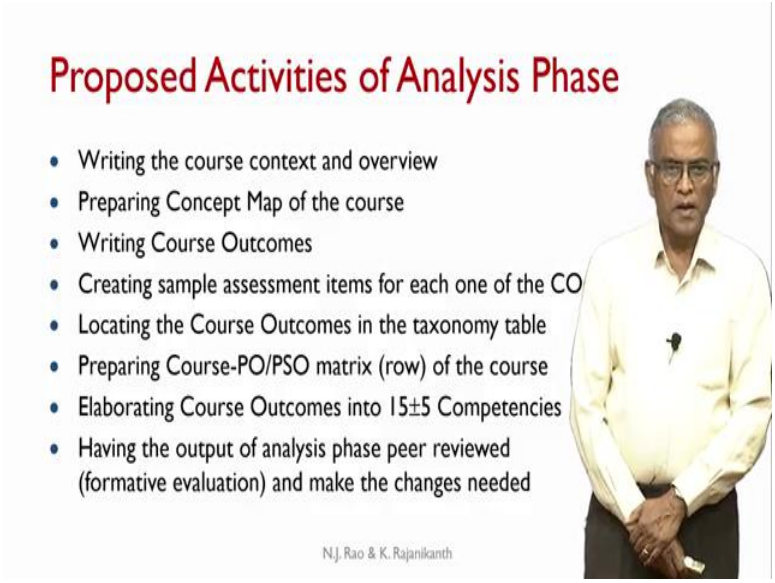

Now, we propose, as we said it is all design activity and it is not unique. Based on our experience with several faculty of the undergraduate programs in engineering, we are proposing this set of sub-processes of analysis phase. First thing is, right in the course context and overview, then, preparing concept map of the course, writing course outcomes.

Creating sample assessment items for each one of the COs. Locating the course outcomes in the taxonomy table, preparing course PO-PSO matrix which it happens to be a row in the case of a course. And then, elaborating course outcomes into 15 plus or minus 5 competencies. And having the output of analysis phase peer reviewed, other is formative evaluation, and other is make the changes needed.

These are, as you can see, we are talking about 8 sub-processes. Some of them may can be combined into a single one or something can be broken into more number of process as we feel convenient about it.

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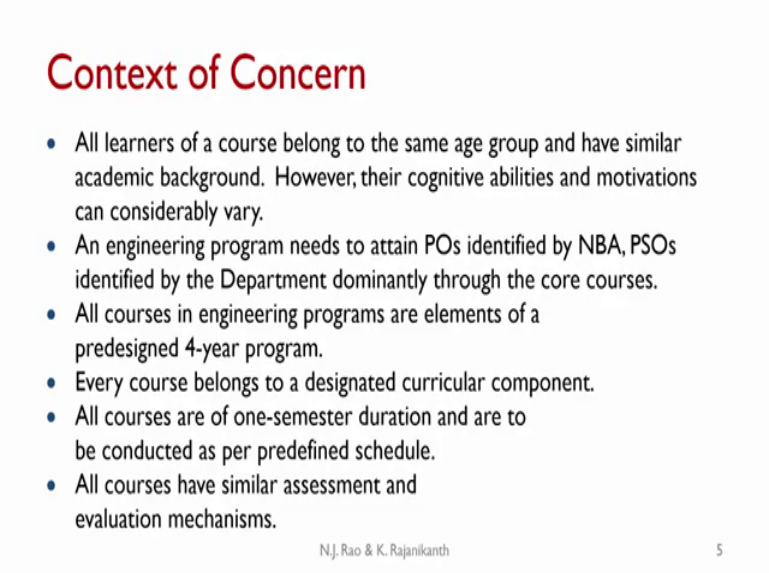

Now, first one is context of concern. What is our context? Our context is 4 year undergraduate engineering program. All learners of a course belong in India to the same age group and have similar academic background. However, their cognitive abilities and motivations can considerably vary, depending upon which engineering college you are talking about.

But if you take the scenario of ESA, you are likely to have students into engineering programs at several, belonging to several age groups. They will not be immediately after 12th standard. They may come to engineering program after working in the industry or outside organizations for several years and then may want to come back and do.

So, the context becomes completely different there. And in India, an engineering program needs to attain POs identified by NBA, which we have stated very clearly in the module 1 and PSOs identified by the department dominantly through the core courses. Here, PSOs are identified by the department. This identification itself will have to go through a very structured and documented process.

And generally, you POs and PSOs to start with before you decide the curriculum. That needs to be done in that sequence, but in actuality it may not happen exactly that way. And these POs and PSOs have to be dominantly attained through the core courses. Or the activities, teaching learning activities, that involve all the students of the program. So you cannot include elective courses into this.

So, all courses in engineering programs are elements of a pre-designed 4 year program. So, our context is when you look at a course it is, it should be seen as an element in a 4 year program. And every course belongs to a designated curriculum component. What are curriculum components? They will be engineering science, basic science, humanities and social sciences, professional core, professional electives, open electives, project and so on.

So, any course that you take, core course you take from the program, it belongs to one of the curriculum components. All core courses are of 1 semester duration and are to be conducted as per pre-defined schedule. So, schedule is defined, the number of working weeks are defined and the entire timetable is already pre-fixed and you have to conduct the course in that pre-defined schedule.

And all courses also have similar assessment and evaluation mechanisms, either it is decided by the university or it is decided by the autonomous institution. The process, the processes of assessment and evaluation are common at least for all the courses in a given program.

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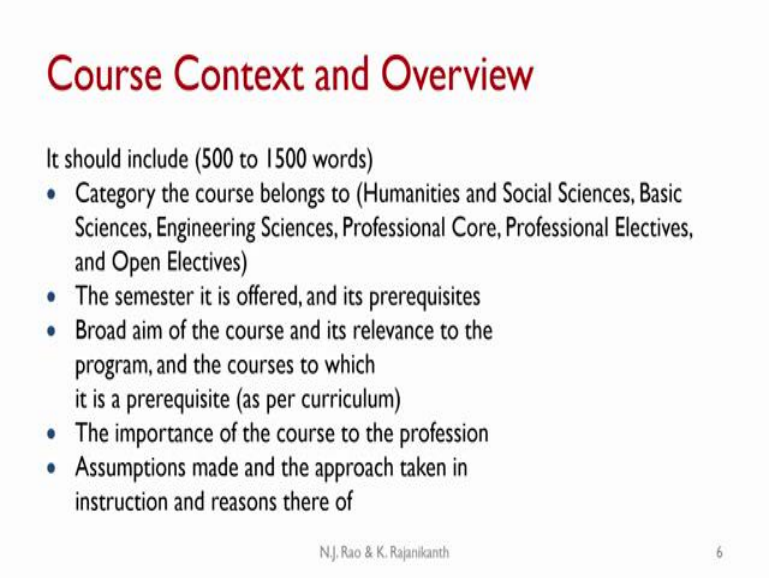

Now, let us look at course context and overview. We recommend you write as much as you can but let us say it can be anywhere from 500 to 1500 words. So about one and a half typed pages you can write up to that. The, what are the elements that you want to write in a course context and overview, category of the course it belongs to, that means, what curriculum component it belongs to.

We have given the list there and then the semester it is offered, and it is prerequisites. It could be a 3rd semester course, 4th semester course and then what are its prerequisites you have to identify. Broad aim of the course and its relevance to the program. Why are, why is it included in, first write what is a broad aim of the course and try to write a justification why it was included into the in program at all.

And also, you can identify the courses who to which it is a prerequisite. If you take the curriculum which is already pre-designed, you may be able to trace the relationship of this course to courses that follow this in later semesters. So you can also relate this course to the other courses, and try to write importance of the course to the profession.

Why is it important to a particular branch and the kind of jobs that you do. Why are we learning that, why is it important to the profession? And mostly, in the last one, will have to be very elaborate. Assumptions made and the approach taken in instructions and reasons thereof. So while designing the course, you make certain assumptions, about either the relative importance of the topics, or your view why this course is required.

And you make several assumptions before you actually work out the work the remaining processes. And then you also write, what is a approach you are taking in the instruction, and this approach may differ for certain outcomes from the other outcomes. You may not be able you may not want to take the same approach to all the components of the course.

For example, some part of the course could be purely theory and lot of mathematics involved. You will take one particular approach for that. Some may be design oriented. Some topics may be design oriented. And then your instruction will be completely different from that. So try to explain first to yourself as well as to the learners that what is the approach you are taking for instruction, and explain why you are trying to take that.

This particular thing, the assumption and the approach is taken, can differ from one instructor to the other with respect to the same course. Or, if there are several batches, several sections for the same course, all the teachers concerned can sit together and

write, write, try to take a common approach of instruction. It would be nice if all the concerned teachers can sit together and take a common approach.

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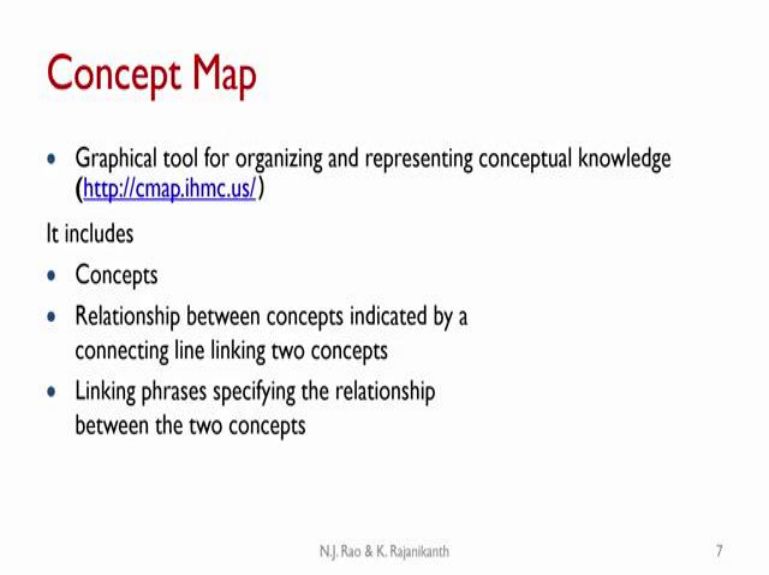

Now, one of the things is, one tool actually called concept map. It is a graphical tool for organizing and representing conceptual knowledge. It is a simple one. It includes concepts and also it captures relationship between concepts. You indicate that by connecting lines linking to concepts and also while connecting you write some phrases, specifying the relationship between the 2 concepts.

We will presently show the examples. So concept map is really identifying concepts and arranging them in a particular order and linking one concept to the all the concepts that are related to that.

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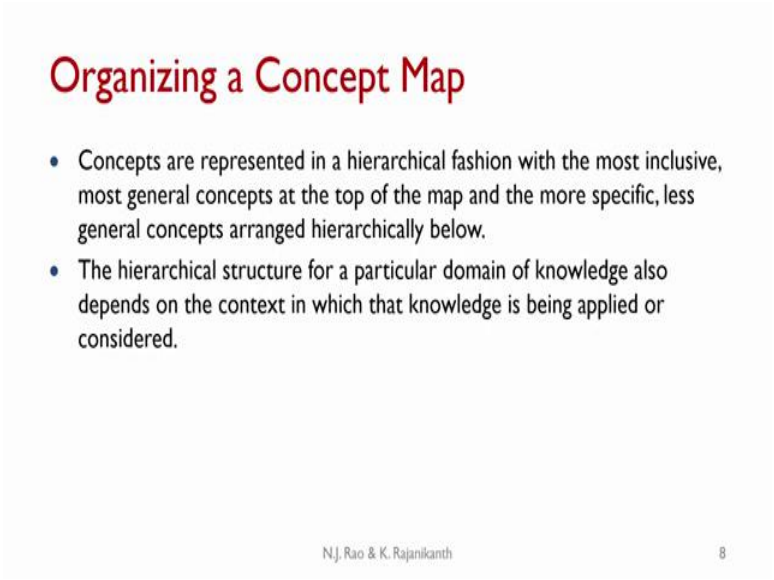

The concepts are represented in a hierarchical fashion with the most inclusive, most general concepts at the top of the map and the more specific, less general concepts arranged hierarchically below. So there is a hierarchy of these concepts. What happens if consider concept map has 3 levels, the lowest level concepts one or more together are become prerequisites to the concepts which is one level above.

That is how you can link the concepts. And also, the hierarchical structure for a particular domain of knowledge also depends on the context in which that knowledge is being applied or considered. So, you may, based on your assumptions, what are the prerequisites. If certain prerequisites are not there then the present course itself have to capture the prerequisites and the related concepts into the concept map. That is why it depends on the context.

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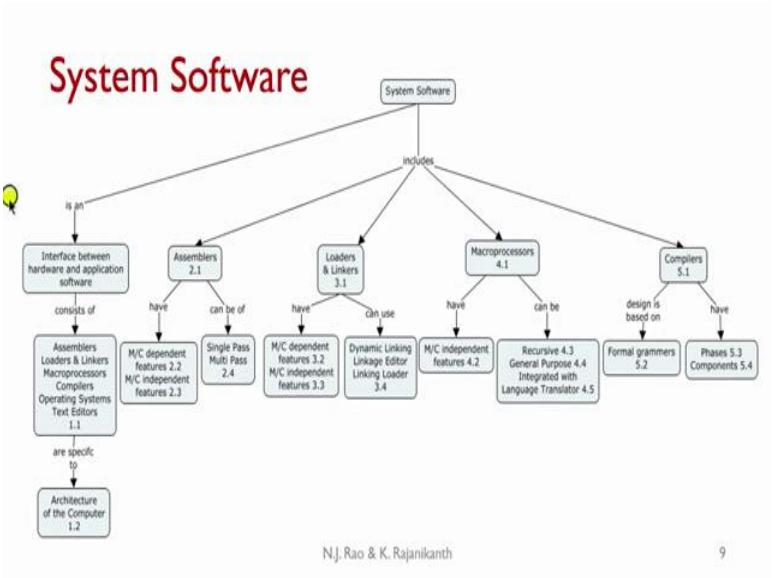

Now, this is an example of a concept map. How does it look like? This is system software and system software. Here you have a line connecting from here to this and there is a phrase, if I read system software is an interface between hardware and application software, So, interface between hardware and application software is a concept.

And again interface between hardware and application software consists of assemblers, loaders and linkers, microprocessor, macro-processors, compilers, operating systems and text editors. Now, in this particular box, I have put several elements. All of them are concepts I could have done by spreading them out into multiple boxes.

But here, for the sake of brevity, we try to put multiple concepts at the same level in one box, okay. Each one, assembler is a concept, loaders and linkers is a concept, macro-processor is a concept and so on. And these are specific to the architecture of the computer. So, as you can see, you are now tracing the entire system software in terms of this.

And then what we are doing is, having described this, now system software includes these elements and I may not be dealing with all of them. All the things that are listed here. I may confine myself only to these 4 and each one again, I elaborate. So, assemblers have mission dependent features, mission independent features can be of a single pass or multiple pass.

So, we elaborate each one and as you can see, though I am putting multiple elements in each one but each one of them is a concept. Now, I chose to even number them. For example, it is 1.1, 1.2 like this, and as it travels along I keep changing the numbers like this. And once I create a concept map like that then it becomes much easier to write the course outcomes.

For example, I can write one course outcome to represent the entire thing. And I can write one course outcome to represent them. So immediately that I can see, I need to write 5 course outcomes when I have a course like this.

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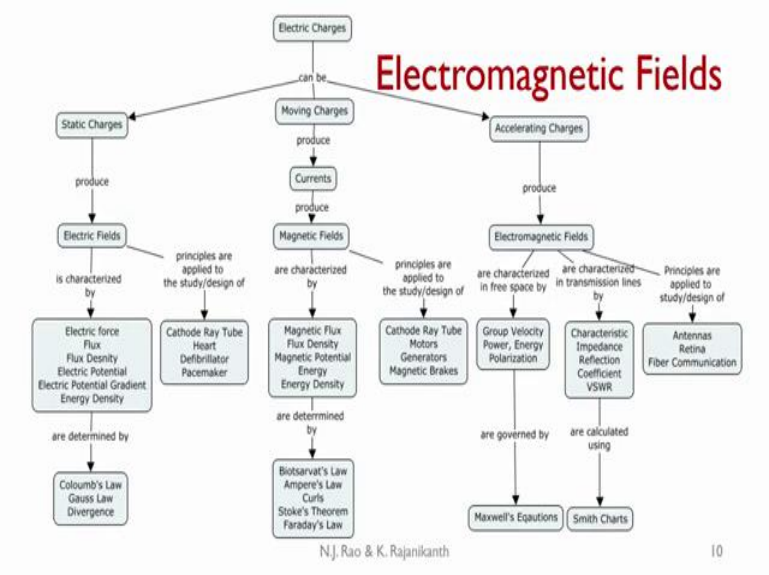

Now let us look at yet another course. This is one of our favourite ones designed by very senior professor in this area electromagnetic fields. Electromagnetic fields, here, are seen as can be static charges, moving charges and accelerating charges. And you they, here static charges produce electrical fields, moving charges produce currents which produces magnetic fields and accelerating charges produces electromagnetic fields.

And then these are elaborated, and each one is elaborated further, both into its applications and the kind of what characterization each field has and all those concepts are presented here okay. When you look at it, I may or may not be able to just write one course outcome here for this and one course outcome for that.

I may break it into 2 or 3 course outcomes for each one of them, depending on to what level of detail I am I am dealing with this. So, this a great way of presenting a

completing a course to students in a graphic form and with a bit of shuffling I can also relate it to in what sequence that I would go and why I am going from one point to another and the relationships and prerequisites of the concepts.

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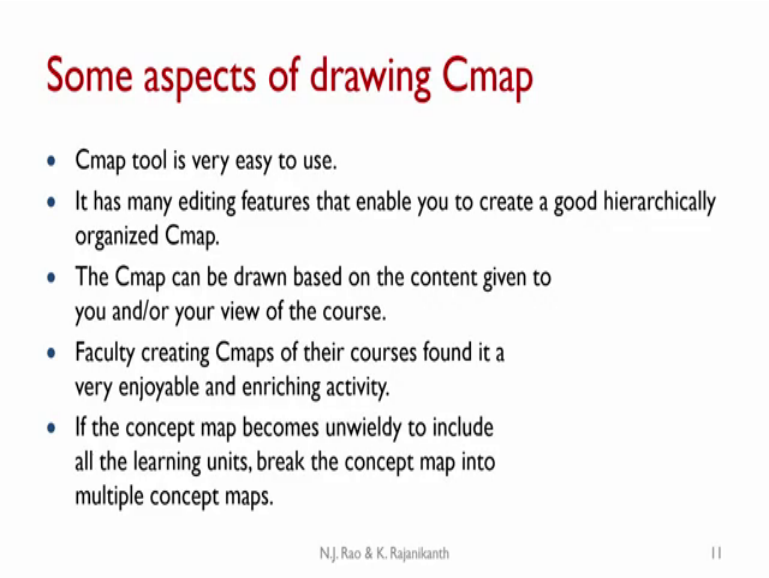

So let us talk a few aspects of drawing C-map. C-map tool is very easy to use. It is one of the simplest one to learn. A new person can learn it about in 5 minutes and within 5 minutes you can start focusing on the subject matter rather than on the tool. It has many editing features that enable you create a good hierarchically organized map.

So when you first draw the map it would not look like what I the samples that I have shown you. It will be quite dispersed and all boxes go in all kinds of directions but the editing features of that will enable you to kind of bring it into a nice well-organized map. And it can be drawn on the content given to you and your view of the course. And we found faculty creating C-maps of their courses found it a very enjoyable and enriching activity.

When we conducted workshops where people were asked to write that, it took time for them so one has to be a little patient. It may take half a days worth work with 2 or 3 people working together. And finally you get a picture of your own course which possibly you would not have ever experienced that.

And if the concept map become unwieldy because there are too many layers and too many boxes around and you find it difficult to kind of put together in a systematic

fashion, you can break a concept map into multiple concept maps. You will be able to learn that very easily, once you get used to that.

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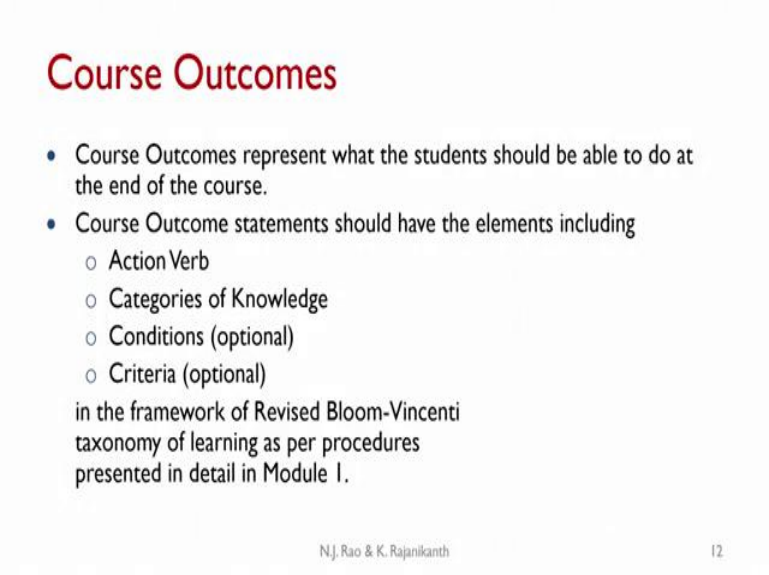

We talk about now course outcomes, which we have done extensively in module 1. Now to say course outcomes represent what the student should be able to do at the end of the course. That we have stated already. And course outcomes statement should have elements including action verb, categories of knowledge, conditions which are optional, criteria which are optional.

And there written in the framework of revised Bloom-Vincenti taxonomy of learning as per the procedures presented in detail in module 1. And this business of writing course outcomes becomes integral part of analysis phase, that is why we are mentioning here but we will not talk about all these details once more.

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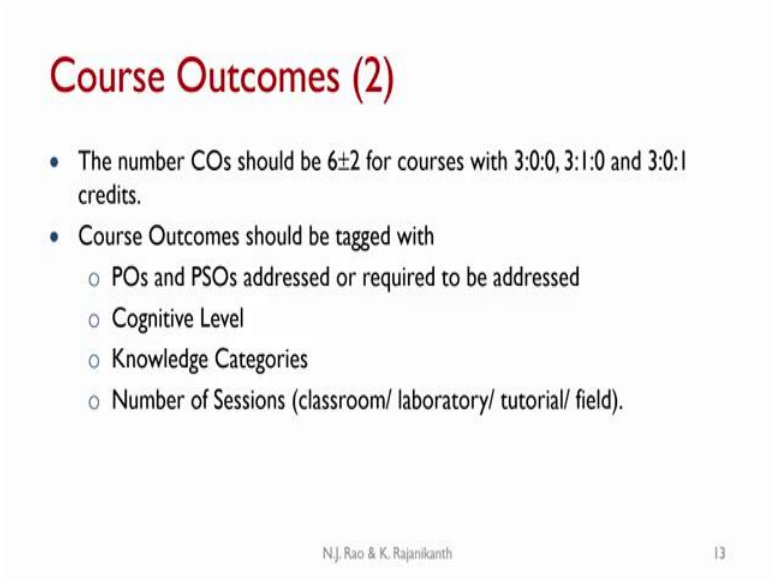

And, just a little more, few more details, the number of COs should be 6 plus or minus 2 for courses with 3 to 4 credits. Course outcome should be tagged with POs and PSOs addressed or required to be addressed. The cognitive level, knowledge categories, number of sessions, a course can include classroom sessions, laboratory, a tutorial or field sessions. So whatever you have, you have to tag each course outcome with this.

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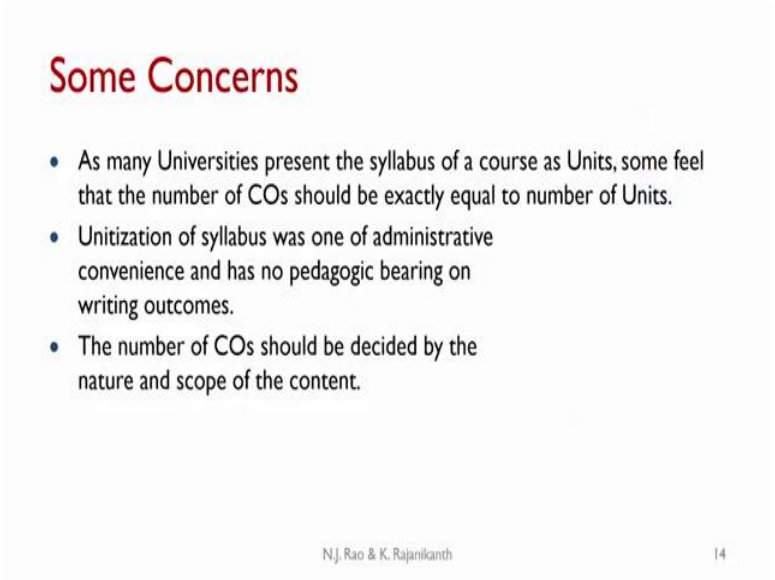

And, some concerns while writing the course which you have mentioned earlier, many universities present the syllabus of a course as units. Some feel that the number of COS should be exactly equal to the number of units, that kind of equivalence is not

pedagogically or academically justified. Unitization of syllabus was one of administrative convenience and has no pedagogic bearing on the writing outcomes.

The number of COs should be decided by the nature and scope of the content. So one unit may have more than one outcome. Sometimes one course outcome make may be straddling two units also. S, it depends on the nature of the content rather than strict unitization.

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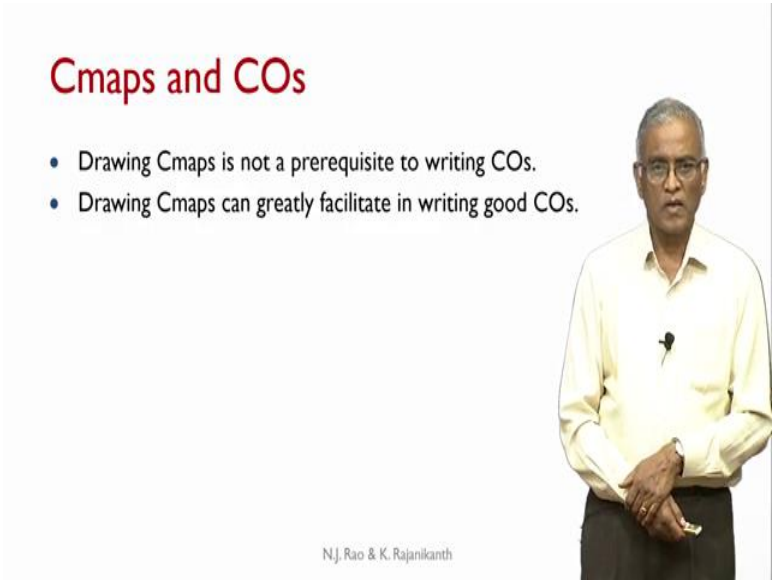

Now, coming to C-maps and COs, drawing C-maps is not a prerequisite to writing COs. We are saying it is desirable and it is a great experience. It will greatly enhance your understanding of the subject from a concept perspective but it is not a prerequisite to writing COs. So, it is not mandatory anywhere for you to prepare a concept map but if you can do it, it will greatly facilitate in writing good COs.

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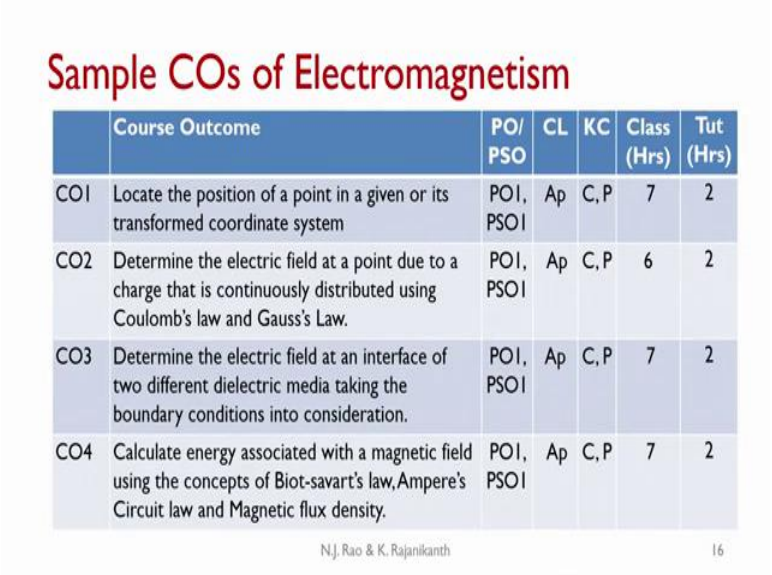

Now this is a sample COs of electromagnetism. I will read only first one. CO 1 locate the position of a point in a given or its transformed coordinate system. That is the, locating the position of a point, that is the course outcome, and it is it is tagged with PO 1 and PSO 1. It belongs to apply because you are locating that and knowledge categories are conceptual and procedural.

Class hours are 7, tutorial hours are 2. That is how you tag a each course outcome with the corresponding cognitive levels, knowledge categories and others.

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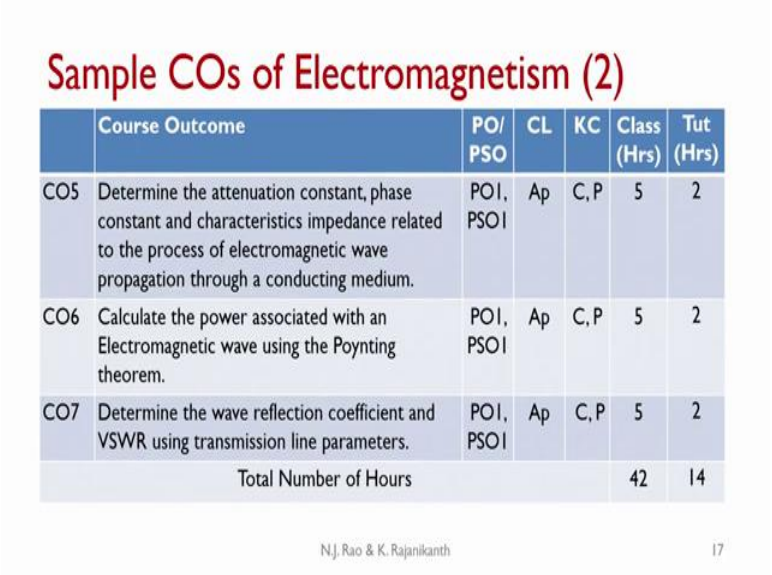

So, this is a kind of sample for you to look at. You can actually take the same table and kind of replace the particular CO with the CO corresponding to your course.

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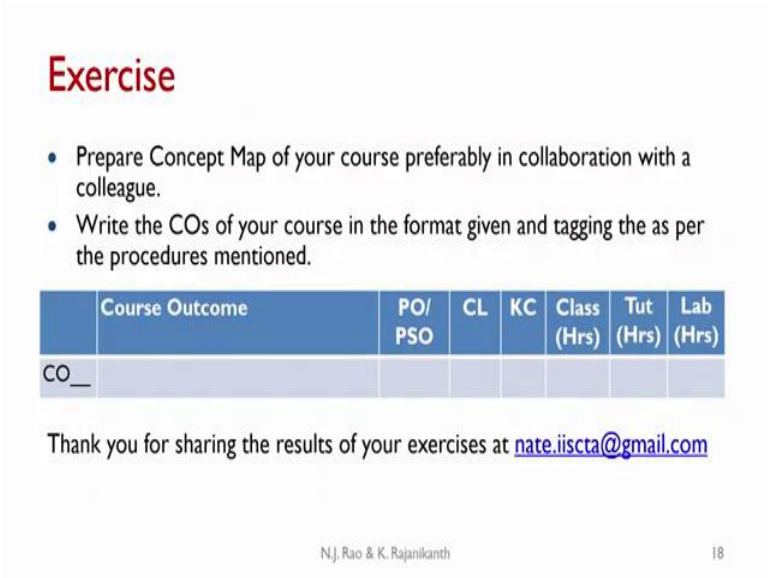

As an exercise, we request you to prepare a concept map of your course preferably in collaboration with a colleague and write the COs of your course in the format given and tagging them as per the procedures mentioned, okay. A table format is given. Please do that and why we did not further elaborate on writing COs is, it has been extensively dealt with in module 1.

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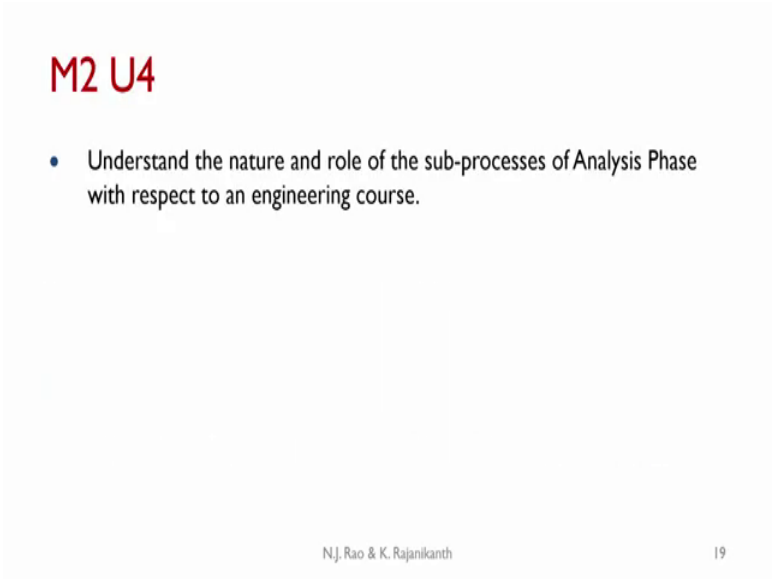

And in the next unit, we will be looking at nature and role of other sub-processes of analysis phase with respect to engineering course. Thank you very much.