

**UNIT 14: The normal distribution and its applications**

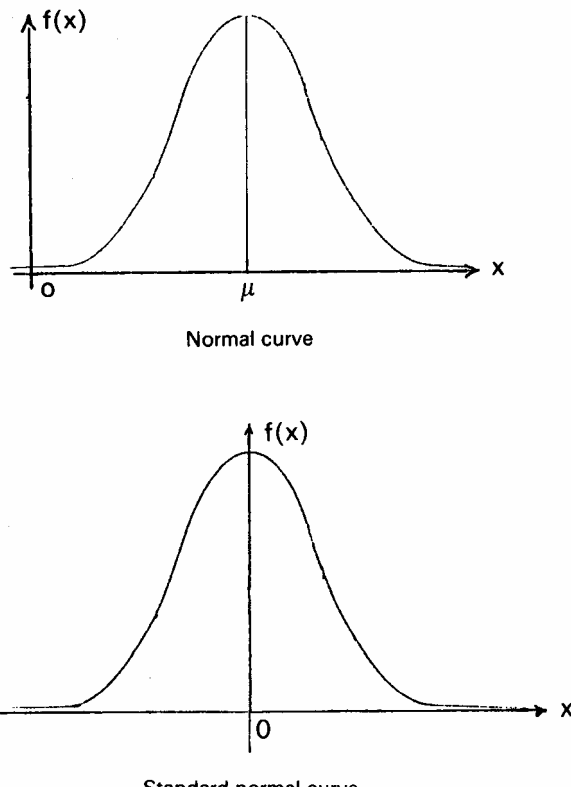
*Specific Objectives:*

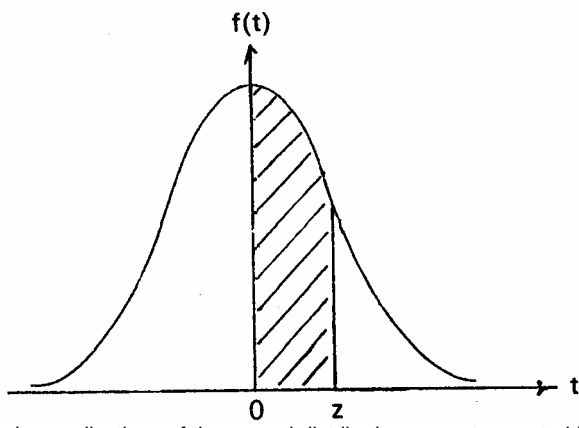
1. To learn the normal curve and standard normal curve
2. To understand the use of normal table.
3. To solve practical problems.

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Detailed Content	Time Ratio	Notes on Teaching
14.1 Normal distribution	3	<p>Preliminary Idea of continuous probability distribution may be provided to broaden students' horizon. The probability function of normal distribution with mean <math>\mu</math> and standard deviation <math>\sigma</math> given by</p> $f(x) = \frac{1}{\sqrt{2\pi\sigma}} e^{-\frac{(x-\mu)^2}{2\sigma^2}} \text{ for } -\infty < x < \infty$ <p>The notation <math>N(\mu, \sigma^2)</math> should be mentioned. For abler students the relation between binomial and normal distribution could be discussed.</p> <p>The standard normal distribution which is a particular case with <math>\mu = 0</math> and <math>\sigma = 1</math> should be discussed. The structure of its probability function could be revealed with the sub-unit 14.2 as continuation</p> $f(x) = \frac{1}{\sqrt{2\pi}} e^{-\frac{x^2}{2}}$
14.2 Normal curve and standard normal curve	3	<p>Important properties of the normal curve such as</p> <ol style="list-style-type: none"> <li>(a) the curve is bell-shaped and symmetrical about the mean;</li> <li>(b) the mean, mode and median are all equal;</li> <li>(c) the flatness of the curve is determined by the value of <math>\sigma</math>;</li> <li>(d) the area under the curve is 1</li> </ol> <p>are to be discussed in detail with the students.</p> <p>Transformation of normal distribution <math>N(\mu, \sigma^2)</math> into standard normal distribution by using the formula <math>Z = \frac{X - \mu}{\sigma}</math> (i.e. Z is in <math>N(0, 1)</math> when x is in <math>N(\mu, \sigma^2)</math>) should be made clear to students.</p>

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Detailed Content	Time Ratio	Notes on Teaching
		 <p>The top graph shows a normal curve centered at <math>\mu</math> on the x-axis. The y-axis is labeled <math>f(x)</math>. The origin is marked as 0. Below the graph is the caption "Normal curve".</p> <p>The bottom graph shows a standard normal curve centered at 0 on the x-axis. The y-axis is labeled <math>f(x)</math>. The origin is marked as 0. Below the graph is the caption "Standard normal curve".</p>

Detailed Content	Time Ratio	Notes on Teaching
14.3 Normal table	4	<p>Students are expected to know the values of the area under the standard normal curve given by</p> $A(z) = \frac{1}{\sqrt{2\pi}} \int_0^z e^{-\frac{t^2}{2}} dt$ <p>which are tabulated in the normal table.                      For <math>Z</math> in <math>N(0, 1)</math>, students should be led to use the table to find values like <math>P(z &gt; a)</math>, <math>P(z \leq b)</math> and <math>P(a \leq z \leq b)</math> to solve practical problems. However, they should be reminded to transform those distributions in <math>N(\mu, \sigma^2)</math> to <math>N(0, 1)</math> before referring to the table.</p> 
14.4 Applications of normal distribution	4	<p>Extensive applications of the normal distribution are not expected however due reference to simple daily life examples is essential. The following example may be taken as an illustration:                      In an examination, the percentage of pass and credit of the subject are 50 and 20 respectively.</p>

Detailed Content	Time Ratio	Notes on Teaching
		<p>(a) If the distribution of marks is assumed to be normal and, also, the minimum pass and credit marks are 40 and 60 respectively, teacher may ask students to find the average mark obtained by the candidates.</p> <p>(b) If the best 30% of those who failed in the examination should be allowed to sit for another assessment free of charge, teachers may guide the students to compute the minimum qualifying mark that is required for the free assessment.</p>
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