From Web Site:

http://www.boac-online.com/travel_tips/dressing_comfort.html

Dressing for Comfort

When we venture outdoors, we're subjected to the temperament of Mother Nature herself, for good or for worse. In certain places in certain seasons, the weather is pretty much predictable and choosing what to wear outside is an easy choice to make. However, things are not so black & white in certain other places where the weather can take a 180 degrees turn within minutes or where daily temperatures can differ up to a range of 20 degrees centigrade or more. Then there is a need to be sufficiently dressed for comfort. Dressing for comfort in the outdoors really means protecting yourself from the vagaries of wind, rain, and cold, plus the heat factor and the sun. What boils down is that our clothing are really our first line of defense against all that nature can throw at us.

The key to having an enjoyable time out there with Nature no matter how bad the weather conditions lies in the concept of **layering** a series of garment over the body to stay in tune with changing body temperatures and external weather conditions. In short, it means peeling off or adding available layers of clothing accordingly to suit the situation as temperatures or weather conditions change. Sounds simple but it takes experience, good judgment and lots of common sense to master this theory.

WAYS OF LOSING BODY HEAT

Our human body is designed for a tropical climate, and it ceases to function if its temperature falls more than a couple of degrees below 37 degree Celsius. To maintain our body's temperature at an equilibrium, it is useful to have an understanding how heat loss occurs. There are 4 ways by which our body loses heat :

Convective - occurs when the warm air adjacent to the body is replaced by fresh colder air. This is the major cause of heat loss. Convective heat loss is increased by wind, as measured by the windchill factor. It can be minimized by trapping the warm ('dead') air around the body by the provision of a windproof insulation.

Conductive - occurs when contact is made between your body and a cooler surface. Water is a good heat conductor and it can cool down the body rapidly. Conductive heat loss occurs 25 times faster with wet clothing than with dry ones. It can be minimized by not sitting on cold ground or wearing wet clothing.

Radiant - caused by the escape of infrared radiation from the body. It is minimized by wearing insulative fabrics or with reflective fabric that reflects the heat back to the body.

Evaporative - occurs when perspiration (water) on the skin evaporates, drawing heat from the body. Clothing must transport perspiration away quickly so that it doesn't use up body heat.

THE LAYERING SYSTEM

While the prime purpose of clothing is to keep us warm and dry in wind and rain, it also must keep us warm in camp when the temperature falls below freezing, and cool when the sun shines. The key to staying comfortable in any situation is using clothing layers that can vary according to what you're doing outside or what the weather is like. The layering system is one of the most important pieces of outdoor equipment, but it's not always understood. Comfort is not a magic button that can be pressed by purchasing sophisticated outerwear. But by applying a little knowledge of layering systems and common sense, it is possible to achieve comfort in a wide range of conditions.
The modern weather protective layering system consists of 3 layers:

- A Base layer of thin, synthetic wicking material that removes moisture from the skin,
- A thicker fleece Mid-layer to trap air and provide insulation, and
- A waterproof/breathable Outer shell to keep out wind and rain while allowing perspiration to pass through..

The Wicking (Base or Thermal) Layer
The **base layer** should be worn closest to the skin. Its job is to wick moisture away from your body to keep the skin dry, thus minimizing wet conductive heat loss and ensuring your comfort. An effective wicking layer should be breathable and non-absorbent. Synthetic fibers like polyester and polypropylene are the best choices; natural fibers like cotton, wool, and silk are not, since they actually absorb and retain your body's moisture. They can become uncomfortable very quickly and then stay that way, since they dry very slowly. The base layer clothing can be found in a variety of fabric weights, from lightweight (for high activity sports where sweating is commonplace) through to mid weight (suitable as stand alone lightweight active shirts) and finally the thicker expedition weight garments (suitable for static activities or very cold conditions).

The Insulating (Mid) Layer
The **insulating layer's** prime function is to trap air, an extremely effective insulating barrier. Worn over the wicking layer, the insulating layer is often made up of synthetic fibers, since they retain their insulating abilities even when wet. They also wick better and dry faster than natural fibers, such as wool, and tend to be less bulky, allowing greater freedom of movement. The insulating layer may consists of more than one garment, such as a thin lightweight fleece worn with a conventional mid-weight fleece. The best-known fleeces are Polartec® fleeces produced by Malden Mills and available under various brands.

The Weather Protection (Outer Shell) Layer
You may know this layer as '**outerwear**' or a 'shell.' It covers and protects all the other layers from wind, rain, snow and sun. If it's wet outdoors, this protective layer must be waterproof to ensure that moisture stays away from the layers beneath it, and it should also be windproof, to prevent convective heat loss with the trapping of warm air within. And finally, like all the layers in a clothing system, outerwear must be breathable, to allow your body's moisture vapor to pass through. Hence the better shell garments will come with ample ventilation options such as full-front zips, and underarms (armpit) vents.

All three layers are important ingredients in the comfort control formula. However, they don't all have to be worn at the same time. Vary them according to the weather and your level of activity.

WATERPROOF / BREATHABILITY
The moisture vapor given off by our body eventually reaches the outer layer of our clothing. If it cannot escape from there, it will condense on the inner surface of that layer and eventually soak back into our clothers. The solution is to wear fabrics that allow water vapor to pass through, while keeping rain out. These are known as waterproof / breathable fabrics. The best outer shell / raingear nowadays are made from breathable fabrics and the original and best well-known is **GORE-TEX**.

Water vapor can pass through a breathable fabric as long as the outside air is cooler than that inside. However, the quickest and most efficient way to let out moisture is by ventilating any garment by opening the front, lowering the hood, and unding wrist fastenings, or just zipping open the underarms vent pits.

TIPS ON LAYERING

Several thin layers of clothing offer better insulation and flexibility than one thick one because they trap air in between the layers as well as within the layers. It also offers the flexibility to fine-tune the amount of clothing you're wearing to match the current temperature.
the ideal layering system seeks to combine elements of insulation, wicking, rapid-drying, breathability, durability, wind-resistance, and water-repellence in a lightweight combination which at the same time offers the necessary freedom of movement by the use of a few layers of garments. Of course, different people would adopt the system to varying degrees to suit their own particular situations.

FABRICS
Selecting the right type of clothing basically means choosing the type of fabrics the clothing is made of AND this decision can make THE difference between comfort or misery. For a detailed look at what type of fabrics are there in the outdoor wear market, take a look at the **Clothing Fabrics Type** page.

Clothing Fabrics *When Comfort Really Counts ...*

NATURAL FABRICS

COTTON
This is the worst wet-weather material as it absorbs water like crazy and takes ages to dry. When cotton gets wet, it loses 100% of its insulation. If you're wearing cotton and happen to be wet, your body is losing heat up to 25 times faster than normal. To compound matters, water evaporates directly off your body, cooling you down further - making you a prime target for hypothermia in cold conditions. For this reason, jeans are the worst thing to bring on a backpacking/trekking trip unless purely on casual basis (ie. around town) or when there is little chances of rain and the weather is extremely hot. Never wear cotton in cold conditions as a form of insulation. For comfort and safety, go for the special synthetic fabrics which are designed to wick away body moisture and keep you dry & warm. The advice is: "Leave it at home!"

WOOL
The traditional material for thermal underwear, it is now superceded by synthetic fabrics. Rather than wicking moisture, wool absorbs it into its fibers, leaving a dry surface against the skin. Although it still retains its insulating properties when wet, the disadvantage of wool is that it can absorb a lot of water, thus making it very heavy when wet (as much as one-third the garment weight) and it can take a long time to dry. It can also be itchy against the skin and allergic for some people.

SYNTHETICS

3 BIG ADVANTAGES:

1. they do not lose their resiliency and insulating capacity when wet,
2. they absorb very little water, and
3. they dry fast.

CHOICES OF SYNTHETICS

POLYPROPYLENE
Low cost and functions very well as a base layer. Polypro is the lightest and thinnest of the wicking synthetics. It doesn't absorb moisture but quickly passes it along its fibers and into the air or the next layer. However, after a day or so, polypro tends to stink - something that can be hard to get rid of. Other than the odor, polypro also ceases to perform properly if it's not washed every couple of days, and it will leave your skin feeling clammy and cold after exercise. Hence it is necessary to carry several pieces along or to rinse out one regularly and learn to live with the smell of stale sweat. These days, polypropelene fibers have been surpassed by the use of polyester fibers in their ability to perform as outdoor insulating clothing.

POLYESTER
Polyester fabric in itself does not absorb water. Today's polyester fabric structure are usually altered so that it absorbs moisture, drawing water from the skin through the fabric to the outer surface where it spreads out and quickly dries. Unlike polypro fabrics, treated polyester can be washed and dried at high temperatures, and treated with an antibacterial agent to prevent odor, it seems like a good alternative to polypro as a base layer. Polyester are more costier than polypro. Some well-known high-tech moisture wicking polyester fabrics are Patagonia's Capilene, Layer's Thermion, Nike's DriFIT, DuPont's Coolmax, Thermax & Thermastat, REI's MTS 2, Comfortrel and Malden Mills' Polartec® PowerDry & PowerStretch.

COOLMAX
A high-performance polyester fabric that moves sweat away from the body to the outer layer of the fabric. Here the moisture evaporates faster making the overall fabric of the garment dry faster than any other fabric. Better evaporation means you spend less energy to cool your body, which increases your performance and endurance. And because CoolMax has better breathability, nothing's more comfortable to wear.

SYNTHETIC NAMES

FLEECES

Made from 100% polyester, fleece clothing plays an essential role in providing insulation, particularly when used as part of a layering system. It is lighter in weight than wool, offers better insulation and remains warm when wet, does not absorb moisture, and dries very fast. It is manufactured in a variety of thicknesses, offering different amounts of loft and insulation and numerous layering possibilities. It is invariably known also as pile. The most well-known high-tech fleeces are the series of Polartec® Fleeces by Malden Mills.

POLARTEC® FLEECES

Polartec® fabrics are a selection of high-tech, high performance materials that are engineered into garments to keep you warm and comfortable in a wide variety of performance activities, across a broad range of climate conditions. Polartec® fabrics are manufactured exclusively by Malden Mills and are made available by various outdoor brands as the mainstay of their fleece apparel wear. No matter what kind of activitiy or climate you are up against, Polartec® fabrics are designed to help you perform at your best, which is why Polartec® fabrics are known the world over as 'The Climate Control Fabric'.

The 100% polyester velour construction creates air pockets that trap air and retain body heat. Unlike less expensive fleece fabrics, Polartec® fleeces maintain their insulating ability and non-pilling appearance after repeated laundering. These fabrics are available in a range of weights to provide the right level of insulation for most outdoor activities

Polartec® Classic 100™
The lightest Polartec® fleece, it allows for fast, efficient wicking during exertion, is quick-drying, and highly breathable. It is ideal for intense training or activity. Soft and comfortable against the skin, it is excellent as a warm first layer or worn alone as a lightweight sweater if it's not too cold.

Polartec® Classic 200™
The most popular and versatile fleece for everyday use, this double-sided, mid weight velour pile fabric is ideal for layering (between wicking thermal & outer jacket) in mild weather conditions, functioning either as an insulating layer or as multi-purpose outerwear. As in other Polartec® fabrics, Polartec® 200 resists piling, stays warm when wet, is quick-drying and can be machine washed.

Polartec® Classic 300™
This is the thickest and heaviest weight high-performanc pile velour, great for extreme cold as it provides the greatest warmth to weight ratio of any pile fabric. Polartec® 300 functions well in extreme cold weather as an outer layer or as a thermal mid-layer.

Polartec® Classics are also now available with a water-repellent surface that sheds rain and snow. The Classics provide not only outstanding warmth without weight, but are breathable and durable, dry quickly, and are great styling options for virtually every end use.

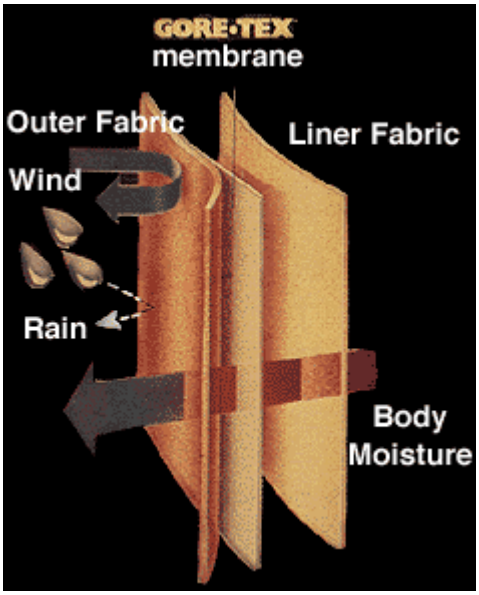
Polartec® Bi-Polar
A breakthrough in pile fabric technology - Bi Polar technology made possible a fabric construction which provides the greatest warmth at a low weight. Made from Polartec® Classic 200 but with unique technical faces on each side of the fabric: the low-pile velour outer face is water repellent and offers improved wind resistance and durability; the high pile inner face has advanced abilities to trap air and so provide increased insulation. It can function either as a warm mild layer or as multi-purpose outerwear.

Polartec® Windbloc®
100% polyester fabric combined with Polartec® Bi-Polar technology:- The Inner is a high pile velour, maximising the amount of air trapped for greater warmth. The Intermediate layer is a laminated barrier that is completely windproof, highly breathable and water resistant. The Outer layer is a high pile velour with a DWR (Durable Water Repellent) finish which sheds rain and snow.

Polartec® Windbloc® fabrics block 100% of the wind and offer maximum protection from the cold and the elements. They combine the warmth of Polartec® thermal fabrics with a polyurethane barrier membrane that allows moisture vapor transmission and is completely windproof and waterproof, eliminating the need for a windbreaker or additional shell. This reduces the weight and number of layers needed to protect and insulate.

These fabrics are very durable, quiet, and non-pilling, and have enhanced stretch and recovery, making them appropriate for general outerwear and accessories where weather protection is desirable. Windbloc® fabrics are ideal when the activity level is low or intermittent, and when cold and inclement weather demands high-performance outer protection.

GORE-TEX®
GORE-TEX is undoubtedly the most famous name in outerwear. This miracle fabric that started the breathable waterproof revolution 25 years ago forever changed the standard of performance outerwear when it was introduced.



Used in everything from hiking boots to parkas and socks, GORE-TEX is actually a microporous membrane that is bonded to other tougher materials such as polyester and nylon. Every square inch of the GORE-TEX membrane has about 9 billion microscopic pores. These pores are smaller than the smallest drop of water, but about 700 times bigger than a water vapor molecule. Water from the outside cannot get through the membrane, but water vapor - perspiration wicked away from the inner and middle layers of clothing - can.

GORE-TEX® fabric is waterproof
No matter how wet the going, no moisture can penetrate through its outer layer, which is why GORE-TEX® fabric carries the Guaranteed To Keep You Dry® promise.

GORE-TEX® fabric is breathable
The more active you become, the more heat and moisture your body produces. Breathable outerwear and footwear aids your body's natural cooling process by allowing perspiration vapor to escape.

GORE-TEX® fabric is windproof
You can't keep warm when the wind is cutting through your clothing. That's why windproof fabric is so important in guarding against the windchill effect that robs heat from your body's microclimate.

GORE-TEX® fabric is durable
To top it off, GORE-TEX fabric is very durable and resistant to oil-based lotions, insect repellents, and a host of other stuff that might be smeared over clothing during an venture into the outdoors. Unlike some 'technical' fabrics that lose effectiveness with hard use or even washing, the performance of GORE-TEX® fabric is guaranteed for the life of the garment.

The main deterrent about GORE-TEX gear, however, may be the high price tag. However with a long term view, it may be a smart investment in your comfort.

WINDSTOPPER®
Manufactured by W.L.Gore, makers of Gore-tex fabrics, the WINDSTOPPER® membrance transforms fleece into a one-layer weather protection system. Windstopper fleece is fully windproof for the life of the garment, water resistant and highly breathable - without losing any of its insulating properties. Use it for any outdoor activities when it's cold and windy and when it still doesn't warrant using your waterproof jacket. When the wind rips through your clothes, it disrupts your body's microclimate — the thin layer of air next to your skin. The cold wind pulls the warm air away and you feel cold. WINDSTOPPER® fabric protects you from this windchill effect by blocking the wind. The pores in the WINDSTOPPER® membrane are too small for the wind to pass through. Because the wind can't pierce through your clothing, your body remains warm and safeguarded.

WINDSTOPPER® outerwear keeps you warm and comfortable with fewer layers and less bulk. The initial cost outlay of a WINDSTOPPER® garment may appears high but it's a smart investment in your comfort in the long run.

ACTIVENT®
A windproof, extremely breathable, and water resistant fabric by the same makers of Gore-tex fabrics. Outerwear made with Activent fabric is the ideal apparel for those times when you stand a greater chance of getting wet from the inside than from the outside. Activent fabric is a unique composite of a microporous membrane and polymers specifically engineered to maximize the performance characteristics required for short duration, high energy activities. Activent fabric is a two-layer or three-layer laminate with a water-repellent finish applied to its surface.

TRIPLE POINT CERAMIC®
Triplepoint Ceramic Fabric by Lowe Alpine - A unique PU coating, containing microscopic pores formed by ceramic particles. This coating is applied to specially woven nylon face fabrics. The Triplepoint Ceramic coating is not a straightforward microporous PU. Unlike traditional microporous structures, the pores (holes) are smaller and more numerous, giving better breathability. The coating is applied to the face fabric, then covered by special secondary coatings for increased durability. You could liken the process to spreading butter on bread. As the coatings are applied, they integrate into the weave of the face fabric. Once there, like butter on bread you'll find it very difficult to remove! That's the secret of Triplepoint Ceramic's durability.

Triplepoint Ceramic is available in five variants:
Triplepoint Ceramic 1600 (150gm2)
Triplepoint Ceramic Quad (150gm2)
Triplepoint Ceramic 1600PF (140gm2)
Triplepoint Ceramic 1200 (100gm2)
Triplepoint Ceramic 1000

Due to the extra weight, standard 1600 and ripstop Quad are more abrasion resistant than 1200 and used in garments or areas where high wear is anticipated. Triplepoint Ceramic 1600PF has a peached finish, giving a soft and supple feel. And TP 1000 is the ultimate in ultralight waterproof/breathability. As all Triplepoint Ceramic fabrics use the same coating technology, breathability and waterproofness are identical.